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Political Deception by Computer?

By Marguerite Zientara
CW Staff

NASHVILLE, Tenn. — Is it deceptive and unethical for a political candidate to use computerized methods to disclose only certain portions of his or her beliefs to certain portions of the electorate? That question was addressed here last week at a session of ACM '80, the conference of the Association for Computing Machinery (ACM), in a forum entitled "The Management of Information in Political Campaigns."

Chaired by Douglas Rochester, assistant manager of corporate systems at Manufacturer's Hanover Bank and president of the New York City chapter of ACM, the session opened with a presentation of the argument against selective disclosure by Dr. Walter Maner, professor of philosophy and computer science at Old Dominion University in Norfolk, Va.

More election coverage on Pages 11, 12 and 13.

Noting that computers have been used in political campaigns since 1960, Maner presented a hypothetical case in which an incumbent senator, "Polly Facets," used various computer-based techniques in her bid for the presidency.

By hiring several computer consultant firms, the senator was able to tailor and deliver her messages to particular audiences,

(Continued on Page 8)

NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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More Interconnection for SNA

By Brad Schultz
CW Staff

ATLANTA — IBM's Systems Network Architecture (SNA) will allow users to make communicating processors equally accessible and to procure network resources from many vendors, IBM Chief Scientist Lewis M. Branscomb said here last week.

The world's largest DP supplier can ill afford to impose a rigidly hierarchical networking structure on many large customers or attempt to exclusively supply their networks, Branscomb indicated at the International Conference on Computer Communication.

SNA began as a "disciplined, single-host controlled structure for transaction applications and has grown to a multihost structure supporting hundreds of terminal types," Branscomb noted in a speech at the conference's keynote session. But as users integrate data and text streams in coming years, the architecture will "include more and more peer capability and more and more openness."

This means making information resources increasingly available to end users in a network without

(Continued on Page 6)

Two Access Methods Confuse SNA Users

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES — Many IBM users have expressed confusion about why their vendor maintains two access methods for its Systems Network Architecture (SNA), nor do they fully understand how the methods differ from one another, two representatives of IBM's Communications Support Center said here last week at the fourth annual Interface West conference.

Because of their confusion, users who migrate to SNA often find themselves hard pressed to choose intelligently between the two access methods — Vtam and Tcam, according to IBM support consultants Al Hedeen and Gary Craig.

"A lot of users who have already gone to Vtam wonder why IBM continues to support Tcam, and a lot of other users who already have Tcam wonder why IBM still offers Vtam," Hedeen said.

IBM Rationale

The rationale behind IBM's decision to simultaneously support two SNA access methods is fairly straightforward: Vtam and Tcam are fundamentally different in conception and serve radically different purposes, Craig explained during an all-day Interface West seminar examining "User Strategies for SNA Implementations."

Vtam is geared primarily to specialized communications monitoring and to supporting IBM's application subsystems like IMS, CICS and TSO.

Tcam, by contrast, is a queued access method and thus is optimized primarily for message-switching systems and

(Continued on Page 6)

Supply Can't Meet Demand

Computer Graduate Seen a Hot Item

By Marguerite Zientara
CW Staff

NASHVILLE, Tenn. — College graduates with computer skills are "about the hottest thing going" and will be for some time, according to Patrick Wash of the Bureau of Labor Statistics.

Speaking at the Association for Computing Machinery's ACM '80 conference here last week, the head of the bureau's research team in the Division of Occupational Outlook told an audience of mostly students the bureau's findings based on its 1974 and 1979 computer manpower studies.

Additional coverage on talent shortages on Page 9.

First explaining why the computer field is expanding so much, Wash cited the fact that in 1970, 100,000 computers were in use, while years later, in 1978, that number had increased to 600,000. Wash also cited International Data Corp. projections that by 1983, there will be 1.6 million computers in use.

Noting that educational institutions cannot keep up with the demand in the "exploding" field of computers, Wash acknowledged there has been a "phenomenal increase in educational programs," which he said will more than double in the next eight years, although "demand will grow even faster."

"The trained supply lags so far behind the demand, that [employers] have to scramble to get you folks," Wash told the students in the audience. "The litany goes on unchanged," he said, describing a common scenario in which an employer hires someone right out of college, trains him, and then, according to the employer, "some headhunter calls, on my time, and offers him $5,000 to move to Cleveland, and off he goes."

Bureau Projections

Wash shared the bureau's statistics on the projected growth of employment requirements for computer occupations from 1978 to 1990. For systems analysts, 1978 employment was 182,000, with 1990's needs expected to be 400,000, for a 119.8% change. Programmers' 1978 employment was 247,000 with 500,000 expected in demand by 1990, for a 102.4% change.

Computer and peripherals operators comprised 393,000 workers in 1978, a number expected to increase to 850,000 by 1990 for a 116.3% change. Computer service technicians, numbering 63,000 in 1978, are expected to total 160,000 by 1990, for a 154% change.

(Continued on Page 8)

Could Computers Be Blamed For Decline in Life Quality?

By Marguerite Zientara
CW Staff

NASHVILLE, Tenn. — Is the general decline in the quality of life worldwide traceable to the rapid proliferation of computers or simply a result of overpopulation in a consumer-oriented society?

More stories on the social impact of computing on Page 4 and on In Depth 1.

Those points of view were enthusiastically debated here last week at the Association for Computing Machinery's ACM '80 conference session entitled, "The Computerized Destruction of Western Civilization."

Theorizing that computer technology is at the root of the rising unemployment rate as well as at the root of increasing violence among the young was Dr. Robert Parslow, deputy head of the Computer Science Department at Brunel University, Uxbridge, Middlesex, England.

Suggesting that the session might

(Continued on Page 4)

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Speeds up to 50M Bit/Sec

Tandem Offers Local Net Links

By Brad Schultz
CW Staff

CUPERTINO, Calif. — Tandem Computers, Inc. has announced communications products that allow its Nonstop processors to trade data at speeds up to 50M bit/sec with other vendors' mainframes and minicomputers configured in a local network.

The Hyper Link permits a Nonstop — described by Tandem as a "fault-tolerant" multiprocessor system — to tap Network Systems Corp.'s Hyperchannel, a wideband networking product, for communications with systems made by IBM, Univac, Control Data Corp., Digital Equipment Corp., Data General Corp., Perkin-Elmer Corp., Cray Research, Inc. and Systems Engineering Laboratories, Inc., among other vendors.

Besides that local net product, Tandem unveiled its Tandem to IBM Link (TIL), which opens a data path between one Nonstop or a network of Nonstops and an IBM 370 or compatible system equipped with IBM's 3803-1 or 3803-2. Under OS/VS, or a similar operating system, TIL emulates an IBM 3420-7 tape drive, handling a burst rate as high as 300K byte/sec.

Tandem also introduced an enhanced version of its Exchange remote job entry software. This version permits use of the Hasp multileaving workstation capability, a spokesman said, for communicating batch jobs to IBM hosts in conjunction with existing 2780 or 3780 support.

"The new communications offerings make it possible for an organization to utilize Tandem's fault-tolerant multiple processor computer system to meet on-line transaction processing requirements while protecting its investment in host mainframe computers," a spokesman remarked.

Hyper Channel Interface

Hyper Link was described as hardware and software Tandem developed to interface Hyperchannel, which transfers data as fast as 50M bit/sec among different makes of systems separated by no more than 5,000 feet. An IBM interest, Satellite Business Systems, recently announced plans to supply satellite interconnections between local networks featuring this Network Systems product [CW, Oct. 27].

Hyper Link connects a Nonstop to a Hyperchannel network through Network Systems' A400 adapter series, which communicate over one of four high-speed coaxial cables, the spokesman explained. A Hyperchannel network can accommodate up to 64 adapter connections, allowing multiple simultaneous data transfers with network multidropping.

TIL is a hardware and software subsystem, the spokesman continued, that facilitates a migration of application functions from IBM hosts to Tandem Nonstops while retaining rapid access to the hosts. New applications, the spokesman said, may be developed on TIL using Tandem's Encompass relational data base management software.

Other Products

Tandem made two other product announcements: A Hasp enhancement of its Exchange remote job entry software and a multiple line enhancement to Tandem's Expand data network software.

The Exchange enhancement reportedly gives Exchange full use of the Hasp multileaving workstation capability for communicating batch jobs to IBM systems, while augmenting existing IBM 2780 and 3780 protocol support. This makes line utilization more efficient, the spokesman explained.

Specifically, the revamped Exchange allows bidirectional and simultaneous file transfers between a Nonstop and an IBM host running Hasp, ASP, RES, JES2 and other multi-leaving remote job entry software from IBM.

Finally, the Expand enhancement gives the network user multiple links between nodes in a Tandem network, boosting throughput and adding further line redundancy as a hedge against line failures. This software extension breaks messages into packets and sends them through multiple leased lines under an end-to-end protocol that Tandem claims will ensure integrity from sender to receiver regardless of the number of lines or intervening nodes in the transfer.

Hyper Link costs $15,250 and is available in first quarter 1981. With a battery of diagnostics capabilities, TIL costs $24,500 and can be ordered now.

Tandem will make the Exchange enhancement at no charge starting this February. Exchange costs $2,000. Tandem will also enhance existing Expand packages with the multiline capability beginning June 1981. Expand costs $15,000 plus a microcode charge of $2,000 per processor.

Tandem is located at 19333 Vallco Parkway, Cupertino, Calif. 95014.

This Week

IN DEPTH

The Menace of Micros ..... Follows Page 62
The Codec Connection ID/14

NEWS

Home Services Seen Fostering Elite User Class 4
Burroughs Users Found Most Apt to Update 5
Tymnet-Certified X.25 Software List Disclosed 6
IBM Denies Bridge From IMS Impossible. 8
DPer Shortage Expected to Persist Beyond 1990 ... 9
Four 3800 Rivals Carry Suspected Carcinogens ... 10
Election '80 11
CBS Coverage Inaugurates Graphics System 13
SBS Plans Nov. 12 Blast-Off for First Satellite 14
Changing DPer Role Seen Leading to Big Bucks... 15
Sitting on Sidelines Held Ill-Advised for DPers 16
On-Line Technology Seen Promoting Deception... 17
DPer-Turned-Manager Told to Change Focus..... 18
Europe Seen Quadrupling Packet Net Demand.... 19
Scientists Join Moratorium Against Soviets..... 20
Smart, Trusted Worker Viewed Likely Defrauder... 21
NSF Grants $4 Million for Local-Area Net..... 22
Texas Medicaid Contract Handed to Bradford..... 23
Robotics Advances Aimed at Assembly Lines..... 25
I/O Standards Anticompetitive, Court Told 26
DPMA Model Curriculum to Push Business..... 29
County Finds 50% Downtime for IBM System 31
System Development to Head Meets 32
Former Students Sue Michigan Computer School . 33
Western Union, IRCs Dispute Gateway Ruling..... 36
Firms Urged to Adopt OECD Privacy Policy..... 38
Contracts Seen Placing DPers in Legal Jeopardy .. 40
Truck Dealership Teams Up Horsepower, CPU..... 41
HP Minis Flight-Test, Certify Rockwell Jets 42
Microfilm System Clears Vicks' Paperwork 43
Plastic Maker Fits Maxi Data Base on Mini..... 44
Turnaround Time..... 46

EDITORIAL

Editorial: Facing Facts..... 48
Taylor Report: RM-Cobol User Breakthrough 49
The Pressure-Cooker World of Proposals 49
'Plugged-In' Solution the Latest Industry Fad..... 50
Structured Programming: A Little Deja Vu..... 54
Technical Manuals: Where Do you Begin?..... 56

SOFTWARE & SERVICES

Users Pick STSC, Avco Tops in RCS Poll..... 57
Univac 1100 Programs Made for Chemical Uses... 58
'Ctop' Version Targets Terminals Under CICS..... 59
System/34 Users Get 'GL Plus' Release..... 62

COMMUNICATIONS

Network Circuit Failure Asks Resources, Control .. 63
Telex Offers Printer for 275, 277 and 278 Units 66
Innovator 202 Printer Centered on Teletype 40 67

SYSTEMS & PERIPHERALS

Shop Treats 370, 3033 as Batch Terminals 69

MINIWORLD

Mini Lets Police Force Seek, Analyze Clues..... 73
Expedite System Offered for Pharmacies 75
Cromemco Unveils S-100 System 76

COMPUTER INDUSTRY

On Top Execs' Trail, High-Tech Firms Raise Ante .. 77
IBM to Make Radical Change In Product Line 77
'Violent Monetary Trauma' Ended 79
Mini Earnings Rise 22% to 91% in Quarter 80
U.S.-Soviet DP Trade at Record Low 81
Research Service Tracks Automation Strategy 82

ADVERTISERS' INDEX 122

GROWTH

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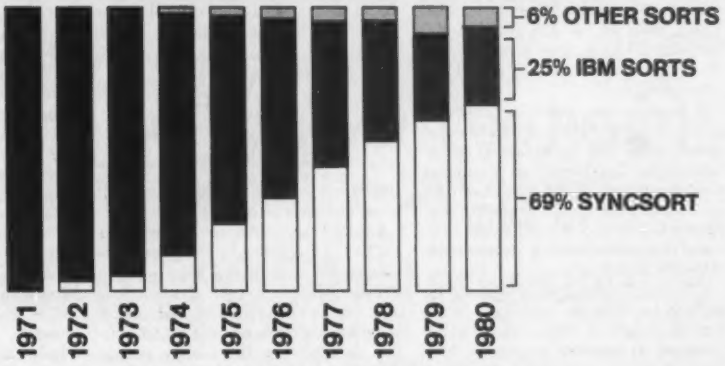

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From IDC's OS Sort Studies

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While Raising Access Costs

Home Services Seen Fostering Elite User Class

By Phil Hirsch
CW Washington Bureau

ATLANTA — The negative implications of newly emerging information services for the home were discussed in detail here last week at the fifth International Conference on Computer Communication (ICCC).

Consultant Konrad Kalba warned that the new technology, if it utilizes overly complex searching and indexing schemes, may result in the creation of an elite class of users. He also suggested that on-line systems may raise, rather than lower, the cost of information access.

If traditional information sources "lose market share, they may be forced to curtail their services, lower their standards and/or increase their price," Kalba explained. Aside from disadvantaging those who could not afford the price increase, this could "raise the need for government or other sources to intervene."

A closely-related problem is that the complexity of new searching and indexing systems may condition many users to "abandon the effort to find the unit of information most relevant to their needs," and impel them to settle instead "for the most accessible."

Kalba, whose comments were contained in a paper read by his associate, Peter Lemieux, pointed out that today, consumers are generally made aware, when they read a newspaper or watch a TV program, of "whether a given message is an advertisement, a news item, an editorial, or a consumer report."

It isn't clear that on-line information services will retain such distinctions, he said, pointing out that "the British Post Office's Viewdata service does not require information providers to differentiate advertising from nonadvertising information.

Privacy is another potential problem, since "some of the new telephone and cable-based media services will [be able to monitor] household viewing, and, if transactional services are made available, purchasing behavior." This monitoring capacity "places potentially enormous marketing power in the hands of vendors with access to personal or disaggregated information on viewing and purchasing patterns. As a result, will marketers be able to manipulate consumers more effectively, knowing what their previous purchases have been?" Kalba asked.

While some consumers "may be willing to sacrifice privacy for the convenience of direct 'electronic' ordering," Kalba said, "the idea of a central data bank compiling viewing habits, purchasing behavior and answers to opinion polls for every participating household raises the specter of 'Big Brother.'"

EFT 'Warfare' Viewed Top Security Threat

By Brad Schultz
CW Staff

ATLANTA — Nations may discover within 10 years that "computer warfare" directed at electronic funds transfer (EFT) is more practical than thermonuclear warfare in destroying other nations.

A leading researcher in computer crime, Donn B. Parker of SRI International, made that conjecture at an International Conference on Computer Communication (ICCC) session here on the day after presidential candidate Jimmy Carter and Ronald Reagan debated thermonuclear war issues on nationwide television.

Although Carter indicated those issues to be the most important facing him as president, Parker said foreign attempts to disrupt a nation's EFT links may prove a more significant threat to national security several years from now.

Unlike the situation with thermonuclear or other military actions, politically motivated EFT assaults often cannot be reciprocated. Through history, nations have avoided initiating a war where their opponents seemed able to retaliate successfully.

"The concentration of assets and records of assets in electronic form in such fragile systems makes new kinds of catastrophes and wars more likely than [thermonuclear attack] in the future," Parker told the session.

Economic Depression

For the U.S., "A material fraud of catastrophic proportions that could cause deep economic depression might be 10% of total negotiable assets, $160 billion." This would be equivalent to stealing total deposits of the nation's two largest banks, or the total assets the Federal Reserve Banks, Parker pointed out.

But $160 billion represents just 0.4% of the funds U.S. banks turned over in 1978, he said. The largest computer-assisted bank heist known to date drove the Herstagg Bank out of business in 1974 with a $330 million loss.

A single theft of $160 billion over EFT links is highly unlikely, Parker suggested, since such an amount could hardly be hidden or used without detection. But it might be possible to steal a hundredth of that sum — $160 million — from a large EFT system handling $16 billion daily without much impact on the system's regular participants.

It would be easier to gradually drain a nation's economy by executing an EFT fraud incrementally over a long period of time than to steal hundreds of millions of dollars in a single act, Parker surmised, but the extended time frame for the former strategy entails higher probability of detection.

"Nevertheless, a well-regulated drain could appear to be an unexplainable weakness in the economy, which

CW at ICCC

would not be solved until too late and economic disaster had set in."

Another way to disrupt the economy via EFT is suggested by the error in reporting the U.S. money supply to the Federal Reserve System about a year ago, Parker continued. In that case, a large bank's clerk was off by $37 billion in reporting the money supply during a three-week period, resulting in $65 billion of "paper and real" losses in the stock and bond markets.

A foreign power might try to cause an economic collapse by gradually modifying indexes such as the money supply through EFT links, the SRI consultant warned.

But a more likely scenario involves holding computer-stored assets for ransom or extortion. The assailants might encrypt those assets, which take the form of bits in a computer, and all backup copies right where they are and demand payment in exchange for the encryption key needed to make those assets usable.

The people or groups most likely to attempt massive assaults on EFT links in coming years were said to be "unethical business enterprises," "extreme political advocates," and "foreign powers."

Italy's Red Brigades have physically attacked 28 computer centers in Europe during the past three years, Parker noted.

Computers May Be Eroding Life's Quality

(Continued from Page 1)

better have been titled "The Technical Attack on Democracy," Parslow projected that the Informatics Revolution will ultimately result in governments assuming totalitarian powers.

Total Misery

Parslow called to mind what he called the "total misery" experienced by "enormous numbers of people" during the Industrial Revolution and paralleled that distress with identical problems we face today, including the existence of slums, high unemployment and a migration to the cities.

"I *don't* want to stop the technological advance, but I feel technical people are duty-bound to warn the public of the potential dangers of the technology," Parslow said.

One area of danger is in personal privacy: "They can get any information about you," according to Parslow, who added that attempts at privacy legislation in Europe have been "ineffective."

In England, he noted, phone tapping is done not only on criminals, but on "all politicians, trade union members and members of way-out political parties."

While it is generally believed that a democracy wouldn't do such things, "it will [do them] if it's pushed hard enough," he asserted.

Unemployment is another major area of concern, according to Parslow. The Informatics Revolution has resulted in many jobs becoming deskilled, as well as in many unskilled workers losing their jobs. The technology will allow all the qualified people to move up the scale, leaving those unqualified or without skills — who can least afford to lose their jobs — unemployed.

Furthermore, the range of unemployment is expected to be uneven — concentrated in the inner-city areas and manufacturing areas — affecting mostly people 25 and younger, and women, who make up the majority of office workers.

When "less gifted" young people,

CW at ACM '80

who have been trained to get a job, suddenly realize at the age of 11 or 13 that they'll never get a job, Parslow observed, the result is an "enormous increase in violence against teachers."

Unemployed, unskilled youths who have never been "trained" to use leisure time will also turn in frustration to vandalism and crime, he said.

Such situations in a consumer-oriented society breed a climate of revolution, against which we can only "fortify our living areas with bullet-proof windows and steel doors," Parslow suggested.

Even worse, he asserted, is the pressure that exists in such times to force the government to take action against the situation.

The expected calls for a "return to real law and order" in the face of widespread unrest "is the backlash that we've got to watch," he said. That backlash leads to totalitarian governments that control the people completely, in the style of George Orwell's 1984, Parslow warned.

Rebuttal Presented

Rebutting Parslow's viewpoint, commentator Gerard Salton, Cornell University professor of computer science, claimed that computers "have almost nothing to do with unemployment; these predictions have never been proven here or in Europe."

Acknowledging that unemployment among those least about to afford it could undermine society, leading to violence and the destruction of "civilization as well know it," Salton offered a different cause.

"The basic root of what we're facing is overpopulation in a consumer-oriented society," Salton said.

For one thing, "there is a greater aggressiveness among people than before," he noted. The "downtrodden" immigrants who entered the U.S. at the beginning of the century "worked like mad and are no longer downtrodden," he observed.

"There is a greater willingness to fight against the establishment, and not only on the part of the unskilled," he noted, citing recent riots in Zurich staged by affluent, university-educated young people.

As for resistance to automation, there have been "a few" strikes related to computerization, as in the recent one at Minneapolis Star and Tribune Co. [CW, Sept. 29, Oct. 20], but these have been "minor skirmishes," according to Salton.

Burroughs Users Found Most Apt to Update

By Tim Scannell
CW Staff

WALTHAM, Mass. — In the next two years, Burroughs Corp. computer users will make the most hardware changes and Univac and Honeywell, Inc. users, the least; but migrating Burroughs users will stick with Burroughs equipment while most Univac and Honeywell users will be searching for a new supplier.

These findings are contained in a survey released recently by the International Data Corp. (IDC) here.

Conducted in the second half of last year, the IDC survey focused on users of Burroughs, Univac, Honeywell and NCR Corp. systems and covered current equipment and future acquisition plans. In all, 782 users with an average of 1.2 computer systems per site took part in the mail survey, conducted as part of IDC's continuous Information Industry and Technology Service (IITS).

Of the 238 Burroughs users participating in the survey, 38% said they will exchange their current systems for a new system in the next two years; most will be moving from a 700 series processor to a 900 series machine. Seventy percent of the firm's 500 series users will upgrade from that model to a later model in the next few years. The 500 series processor will nearly disappear by 1982, the IDC study showed.

Approximately 21% of current Univac systems and 25% of all Honeywell systems represented in the survey will be replaced in the next two years, mostly by equipment from other vendors. Nearly 63% of the Honeywell users considering a hardware change will flock to a new vendor, while more than 58% of Univac users will make the vendor switch, the survey continued.

During the next two years, 35% of the NCR systems included in the survey will be replaced, but by other NCR computers. Most of the firm's Century series users, as well as users of the 8350, 8430 and 8450 systems, will be migrating to the 8455 and the 8555, the most popular systems for NCR users making equipment changes, the report noted.

As part of the survey, participants were also asked to detail the best and worst characteristics of their equipment. Although Burroughs users ranked system software as a best feature, they gave low marks to the firm's support and maintenance.

NCR and Honeywell users rated hardware reliability and system upgrade capabilities as a best feature, but gave low grades to NCR's application software and Honeywell's system software. NCR's marketing, technical support and maintenance were also placed on the low end of the best/worst scale.

Although most gave negative appraisals of their mainframe equipment, the majority of the users surveyed by IDC have been with the same vendor for a number of years. The average number of years for a Burroughs user, for instance, is seven while Honeywell users have stuck with that vendor for an average of eight years. NCR and Univac users have been with the same vendor for an average of nine and eight years, respectively.

Effect of Communications

Users were also asked to comment on the effect data communications has had on their computer site. The findings indicated that while most users are aware of the communications products offered by their mainframe vendors, less than 2% have implemented any kind of a network. And a full 7% have decided not to delve into data communications at all.

However, for nearly every user that is unaware of any network offerings from its particular vendor, there is a user that is considering implementing a data communications system, the report found. More than 25% of the Burroughs users, 27.2% of the Honeywell users, 32% of NCR users and 25.6% of the Univac computer users are considering some sort of a network in the near future.

Finally, the survey pointed out that nearly every user considered IBM before making an equipment selection. Burroughs was the next most frequently considered vendor, followed by Honeywell and Univac.

Burroughs users considered Honeywell equipment more often than IBM, IDC noted.

Details on the survey and IDC's IITS information service are available from the research firm at 214 Third Ave., Waltham, Mass. 02154.

Seminar Stars Carlton Amdahl

DALLAS — Carlton G. Amdahl, executive vice-president of technology for Magnuson Computer Systems, will be the featured speaker at a Magnuson-sponsored seminar here Thursday, Nov. 6.

Amdahl will discuss "Computer Architecture for the User." One of the founders of Magnuson Computers Systems, he led the team that designed and built the company's M80 line of computers.

The seminar will take place at the Hyatt Regency Hotel beginning at 8:30 a.m. Reservations can be made by contacting Harry Carr, marketing representative for Magnuson Computer Systems, at Suite 301, 8700 Stemmons Freeway, Dallas, Texas 75247.

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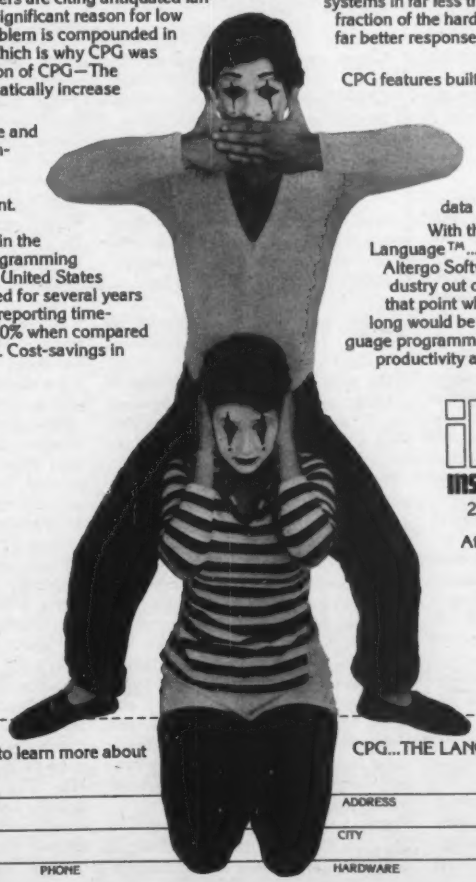

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Eleven Vendors' Products OK'd

Tymnet-Certified X.25 Software List Disclosed

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES — Tymnet, Inc. last week publicly disclosed for the first time a comprehensive list of the X.25 software products that have been certified to run on the company's packet-switched data communications network.

Tymnet had previously identified the certified products only to selected users inquiring about the extent of the network's X.25 support, according to Don Hall, the firm's communications consultant.

Last week's disclosure at the fourth annual Interface West conference reportedly marks the first time that the names of all the X.25 software products compatible with Tymnet's communications facility have been made publicly available in a single written statement.

Speaking at a session entitled "X.25 vs. All Challengers," Hall explained that disclosure of the certified products is aimed at broadening user knowledge of the Tymnet network's X.25 interfacing requirements.

OK Given

Through mid-October, Tymnet had OK'd 11 vendors' X.25 software products for operation on the company's network. Some of the certified products reportedly include Honeywell, Inc.'s Multics operating system, Tandem's Guardian operating system, Prime Computer, Inc.'s Primos operating system running with the firm's 50 series processor and Data General Corp.'s Advanced Operating System coupled to the company's Eclipse minicomputers and Xodiac networking software.

Tymnet has also certified:

- Customized versions of the Dartmouth time-sharing system's X.25 telecommunications interface for Honeywell processors:
- Associated Computer Consultants' IF-11/X.25 interfaces for Digital Equipment Corp.'s RSX-11M communications controller
- Compro's network-access software for IBM's Model 3705 communications controller.
- Cambridge Telecommunications' Data Network Modified Emulation Program for the IBM 3705.
- I.P. Sharpe's in-house X.25 software for the 3705.
- The operating system for Memotec Service Corp.'s Mpac series of processors.
- Systar Corp.'s CMX Network-Communications Executive for the IBM Series/1.

Tymnet is also said to be evaluating at least six other vendors' X.25 software products and is expected to certify each of the offerings soon.

Under the certification plan, users of any of the 11 currently acceptable X.25 software products can communicate through Tymnet's network with any other user of the same system model. Tymnet still lacks the expertise, however, to support X.25 communications between systems from different vendors, Hall said.

The reason for the restriction is that every supplier's X.25 software offering uses a different transport-level protocol and thus is incompatible with competing products from other vendors, he explained.

CW at Interface West

More Interconnections Envisioned for SNA

(Continued from Page 1)

tight controls by headquarters facilities. Although systems might vary in capabilities and functions, endusers would have more license to tap whatever resources linked systems feature.

X.21 and X.25 Attachments

IBM will give users certain products they can attach to networks that employ the X.21 and X.25 interface recommendations of the Consultative Committee on International Telephone and Telegraph (CCITT), Branscomb noted.

CW at ICCC

And the company is "wholeheartedly participating" in the International Standards Organization's (ISO) development of an open systems interconnection reference model, he said.

But, as the former National Bureau of Standards director noted earlier this year [CW, May 26], IBM does not wish to give domestic customers support for X.21 and X.25 across its communications product lines before the nation's common carriers, especially AT&T, do so.

According to informed sources at the conference, IBM's refusal to support X.21/X.25, which are entailed by the first three layers of the ISO open systems model, makes it difficult for data communications users largely supplied by IBM to access the world's major public packet networks. A number of mainframe vendors have announced such support for their respective network architectures, including Honeywell, Inc. and Univac in recent weeks.

The latter two vendors pledged support for the open systems model still being developed, but SNA remains more hierarchical — with implied master/slave relationships between linked systems — than the model defined so far, critics have said [CW, Oct. 27].

Layered Architecture

Network users need a layered architecture, Branscomb asserted. The bottom layers, such as the three containing X.21 and X.25 and the high-level data link control in the ISO model, set the rules for moving messages from one point to another, he said.

The upper layers apply these rules in routing messages along links between sender and receiver and in specifying how to format, print, display and interpret the messages.

Despite allegations that SNA locks users into IBM dependence [CW, Oct. 6], Branscomb maintained that developers of network architectures are trying to define upper layers that can tell a system what to do with the bits it receives without restricting users to a particular brand of equipment.

Regarding local-area networks, the IBM vice-president said the Ethernet specification announced by Digital Equipment Corp., Intel Corp. and Xerox Corp. addresses only the lowest two layers of communication — physical interconnection and data link control — and leaves issues such as session management unresolved.

In the 1980s, some users may elect to integrate DP resources with those of voice communications on the assumption that voice dominates their electronic traffic, Branscomb observed. For them, "the logical way of switching voice and data is to handle both with an intelligent digital PABX."

Other users may view electronic distribution of documents as their dominant requirement, he continued, and transmit multiplexed streams of data and text over broadband lines without attempting to handle voice traffic.

Users may also differ on ways to integrate data and text. Those with multidrop communications loops featuring a wide variety of bandwidths may consider it better to manage control and contention with a processor, since a processor can provide optimum resource utilization.

An alternative view, Branscomb remarked, would be that distributing facilities management among all the network's intelligent devices is preferable. This would allow addition and deletion of nodes having different speeds and characteristics without initiating the changes at the network control room.

'A Custom Kind of Business'

By Brad Schultz
CW Staff

ATLANTA — The computer industry has been "a custom kind of business" until recently, IBM Chief Scientist Lewis M. Branscomb told the International Conference on Computer Communication here last week.

Industry has grown "precisely because it stayed dedicated to the solution of individual problems," he said, unlike the telephone industry, which has offered "universal connectivity for very standard applications."

But the situation is reversing. Computer equipment makers suddenly face the prospect of filling large numbers of orders for particular configurations — mass production, in other words, which calls for more standardization in product design.

And telecommunications vendors now have much more to sell than telephones and other easily standardized commodities. As computing and telecommunications technologies merge, vendors rooted in the latter technology "will respond to an ever-widening variety of applications environments," Branscomb predicted.

To be mass producers, computer equipment vendors will need to make their products easier to install and service, more reliable and easier to use, he told the conference.

"After all, with a terminal for every 10 employees, most [user personnel] will not be DP professionals, nor will they be motivated to accept a less-than-friendly system."

Interactive data terminals and teleconferencing may allow managers and professional people to spend less time in meeting organizational obligations — administrative chores could be done rapidly from electronic desks — and more time in traveling to where their most valued skills, such as in handling individuals or especially complex situations, can be applied.

SNA Methods Confuse Users

(Continued from Page 1)

for transaction-switching networks.

In theory, therefore, SNA users should select Vtam as their access method if their systems' environments are characterized by lots of application-subsystem activity. On the other hand, if their computing jobs involve loads of queued activity and message switching, users would probably be well advised to opt for Tcam.

In practice, of course, efforts to evaluate the appropriateness of the two competing SNA access methods seldom yield such simple, clear-cut results. Most users will probably have to consult at length with their local IBM support representatives and analyze their applications in detail before they can reach an informed decision.

The task of choosing wisely between Vtam and Tcam has been further complicated recently with the announcement of a new IBM software release that enhances Tcam through the addition of improved productivity aids, Craig said.

In other SNA-related comments, Hedeen disputed the widespread user notion that IBM's latest network architecture is little more than another line protocol, a successor to old communications standbys like synchronous data link control, bisynchronous and start-stop. Nothing could be further from the truth, he said.

SNA, as its name implies, is an architecture that "glues" all the pieces of IBM's communication networks together, and, as such, it far and away surpasses a simple line protocol in both technological sophistication and user impact, Hedeen asserted.

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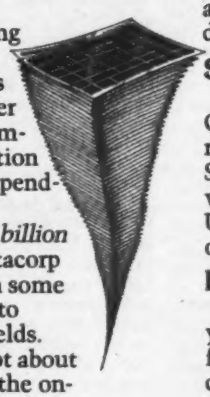

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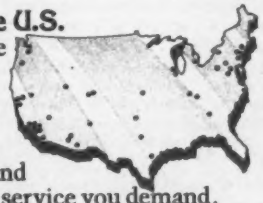

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IBM Denies Bridge From IMS Impossible

By Rita Shoor
CW Staff

ARMONK, N.Y. — IBM denied that a bridge to provide migration from an IMS data base management system (DBMS) to a relational DBMS cannot be built [CW, Oct. 27].

The report was based on statements supposedly made by Dr. Frank King, currently director of General Purpose Systems, after he presented a paper on relational DBMS concepts at the International Federation for Information Processing's (Ifip) Congress 80 in Australia.

IBM's official statement maintained that the article "did not correctly report the technical information [that] Dr. King presented in either tone or content."

"What he said was that the problem of supporting both hierarchic applications and relational applicational applications on shared data is hard and is still being worked on. In no way did he suggest this task is not possible as the author [of the article] states."

An IBM spokesman went on to maintain that the vendor had "never promised a bridge" although "we have stated that we recognize a need for evolutionary data systems direction."

He also maintained that "we know of no such marketing announcements" in response to a statement that such announcements have been used to prevent potential DBMS users from migrating to other data base systems.

The vendor representative also claimed that King did not indicate that multiprocessing was necessary in order to achieve "reasonable performance" with a relational DBMS. "Acceptable performance is being achieved today on uniprocessor systems," according to King. However, he stated that "multiprocessing may be a direction for even higher performance" in the paper released at the Ifip conference.

Qualifying all statements specifying achievable transaction speeds with the disclaimer that "any transaction rate measurement has to be dependent on the application complexity," IBM maintained that the airline control program (ACP) could achieve transaction times up to 180 per second on a 5M-byte processor.

In comparison, 20 to 50 transaction/-sec rate is achievable with hierarchical models, and implementations of System R — IBM's experimental relational DBMS — handle between three and 20 transaction/sec on 5M-byte hardware.

King maintained that relational systems "can approach the performance of current network and hierarchic data base systems." But, there is always a trade-off between performance and functionality — a term that encompasses such factors as data independence, higher level application programs and easing the data base administrator's function.

"In a wide variety of applications, we have seen that it makes sense to trade these user productivity achievements for performance where this trade-off is economical," he noted.

Computers Fostering Political Deception?

(Continued from Page 1)

based on census tract data, city directory data and established sociopolitical categories. Word processing technology allowed Polly Facets to send seemingly "personalized" letters to those portions of the electorate most likely to be receptive to certain portions of her campaign platform.

"The question is, should a candidate try to be different things to different people, according to their differences, or should she try to be all things to all people, despite their differences?" Maner asked.

Pros and Cons

In an attempt to answer that question, Maner presented arguments both for and against the concept of selective disclosure. Arguments for selective disclosure included the following:

- The voter is responsible for acquiring the information he needs to make an informed decision.
- The voter should realize that campaign rhetoric is motivational, rather than educational, by nature.
- The voter has a limited and selective attention span, and so the candidate must enter the voter's "operating mode."
- Since the means of mass communication are neither cheap nor plentiful, with only four major television networks and normally one newspaper per city, a candidate is limited to coverage she can afford.
- The purpose of political campaigns is to promote rapport with the voting public. Therefore, the candidate must try to find common ground with the electorate.
- The candidate is not a source of ideas, but rather a mirror capable of reflecting the interests of main political groups.

As for arguments against selective disclosure, which Maner noted were in line with his opinions, he suggested:

- Filtered truth, though still "the truth," reduces the quality of information available, in turn reducing one's options.
- If the intent of selective disclosure is to misrepresent or conceal the truth, it is the moral equivalent of lying. It illustrates "one of the great ironies of truth-telling — you can disclose the truth and deceive simultaneously," Maner said.
- A candidate forfeits her right of privacy in terms of political beliefs as soon as she declares herself a candidate — her ideas and information about her are then in the public domain.

In conclusion, Maner suggested, "while one may imagine cases were 'information overkill' occurs with consequent stultification of choice, the normal cases would be those where poor information leads to poor choices."

As for a solution to the problem, Maner suggested that "equal time" laws be strengthened to produce an equal distribution of information that candidates be required to file comprehensive, standardized dossiers that would be available to the voters; that campaign data bases operated with public funds should be in the public domain; and that there is a dial-up citizen inquiry system that tells all candidates' positions on all issues.

CW at ACM '80

In direct opposition to Maner's viewpoint was that presented by Dr. Paul Lutzker, president of Targeting Systems, Inc., (TSI) in Washington, D.C., a firm that makes use of the Claritas Corp. Cluster system [CW, Sept. 24, 1979] to locate a candidate's potential backer.

In presenting his rebuttal to Maner's argument, Lutzker outlined a second hypothetical case, in which a candidate had scarce resources in terms of time and money; there was low interest in the election on the part of the electorate; and the candidate felt, from past experience, that some information would be of more interest to some voters than others.

"The question facing the candidate is, can she segment the electorate and influence those most likely to be receptive, or should she assume the sole burden of informing the entire electorate about all issues?" Lutzker said.

Voter behavior studies have shown that a candidate should solidify his or her base, that different issues are important to different voters and that candidates' personality traits have proven instrumental in getting elected, Lutzker noted.

In describing TSI's Claritas Cluster system — developed in 1973 and first applied in 1978 — Lutzker explained it makes use of aggregate census data at the block-group level, identifying geographic areas in terms of urban, suburban or rural areas, income levels, mobility of the dwellers, ethnic diversity and where most of the inhabitants are in "the family life cycle." From those attributes, the system describes every block in the entire country, coded into 40 classifications.

Code 37, for example, is the "bohemian" type of neighborhood — predominantly peopled by single, slightly above median income, highly educated groups of diverse ethnic backgrounds.

Noting that techniques such as the Claritas Cluster system are most beneficial to the candidates in terms of efficient use of campaign resources, Lutzker said the press and political opponents are "time-honored" sources of information.

Computer-aided techniques that target specific types of voters who are most likely to want particular information are "useful tools that aid rational voters in making rational and wise decisions," Lutzker claimed.

Although such methods can be used to deceive, the penalties for deception are too great, he asserted, adding that, undoubtedly, "most attempts to deceive will fail."

Computer-Skilled Graduate Called 'Hottest Thing Going'

(Continued from Page 1)

The only area of reduction in demand is for keypunch operators, who numbered 273,000 in 1978, a number expected to drop to 230,000 in 1990, a 15.8% change.

Low Unemployment

In addition, the 1978 unemployment rate for all workers was 8%, while for systems analysts, programmers and technicians, it was 1.9%, a figure Wash called "incredibly low." As for computer operators, who have less attachment to their careers because of less training invested in them, the unemployment rate was 3.1%. Keypunch operators — the only area in decline — had a 6.6% unemployment rate, "still below the national average," Wash pointed out.

The unemployment figures for DP-related jobs represent mainly people who left their jobs voluntarily to move to a different area, he noted, adding that the field features such enhanced job mobility because of the high demand. "There are more options to change jobs, and more likelihood that one will be enticed to change jobs than in other fields," Wash said.

Such demand has resulted often in the hiring of people without computer degrees, but who are qualified by virtue of having engineering, business or other degrees, he said. "There is no defined and strictly enforced route of entry to the occupation."

As for salaries, college placement council data indicates that as of March 1980, people with bachelor's degrees in computer science were being offered starting salaries of more than $18,000. People without a computer-related degree who were hired in DP jobs were offered "a couple hundred dollars less" than that figure, he said.

Masters' degrees in computer science resulted in offers of $21,500 on the average, to start, according to that data. Wash cited a Fox-Morris survey for mid-1980 [CW, June 2, 1980] showing that software programmers with an average of 4.1 years of experience earned $24,900. Systems analysts with 5.6 years of experience earned $23,800 and applications programmers with 3.5 years' experience earned $21,700.

All of those figures are an average of 16% higher than the year-earlier figures, Wash noted.

Employer's View

Giving the employer's perspective on recruitment was Roy Cottrell, manager of administration, budget and technical services for Missouri Pacific Railroad (Mopac).

Cottrell described his firm's method of recruitment, which relies mainly on college recruitment, training and in-house training.

"We feel someone who has had the academic exposure of getting a college degree is probably trainable," Cottrell said.

While the railroad's own system of technical interviews resulting in the recruitment of college graduates "offers the best candidates and is the most cost-effective," according to Cottrell, the organization at times depends on other sources of employees.

Declining Science Education Blamed

DPer Shortage Expected to Persist Beyond 1990

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The current shortage of computer professionals in the U.S., at all educational levels, is expected to persist beyond 1990, the National Science Foundation (NSF) said recently.

In a report prepared jointly with the U.S. Department of Education, NSF blamed the shortage on the declining emphasis on science education in the U.S., lack of proper training equipment and facilities and the exodus of qualified university DP instructors to better paying positions in private industry.

Measuring the problem, NSF projected approximately 550,000 openings in the U.S. between 1978 and 1990 for programmers, systems analysts and other computer professionals. During the same period, the study foresaw no more than 157,000 persons receiving baccalaureate or master's degrees in computer sciences.

Although many practicing DP professionals have been recruited from other disciplines, the shortages will definitely persist through the decade, the report said.

Trends for computer professionals have been similar to those for engineering: namely, rapidly rising undergraduate enrollments and decreasing Ph.D. production, according to the report. The result will be eventual cutbacks in undergraduate programs as the shortage of qualified instructors accelerates.

In fact, the decline may occur during this decade, the report suggested, as faculty erosion continues, with qualified faculty members being lured into private industry for more challenging and better paying positions.

Declining Ph.D. production and the availability of more attractive employment opportunities in industry for persons with doctorates in engineering and the computer professions have already led to a shortage of both junior and senior faculty in these fields, the study found.

College Vacancies

The report refers to a recent survey that found approximately 200 vacancies in college departments specializing in the computer profession and as many as 2,000 unfilled positions on engineering faculties.

"These vacancies are straining the capacity of these schools and departments," the report said. The size of many undergraduate classes has already increased to the point that students are not receiving enough personalized instruction. In addition, overworked teaching assistants are burdening senior faculty members, who are then left with less time for research, the report added.

Compounding these problems, much of the laboratory equipment and facilities for research and teaching in university computer departments was acquired during the 1960s, the study noted. This lack of access to state-of-the-art facilities for faculty and graduate students "decreases the attractiveness of academic careers and contributes to the engineering and computer profession faculty shortage problems."

Obsolescence of instructional equipment also implies undergraduate education in computer sciences is itself obsolete vis-a-vis current industrial practices, the report said.

These problems suggest the capacity of engineering and computer schools to accept and provide an adequate education to all qualified applicants may be reached during the present decade, the report said. Also, the "rigidity implied by the strained capacity of these schools and departments limits their ability to respond to changing demands of the engineering labor market."

The report concluded that while federal programs can help alleviate faculty shortages and equipment obsolescence problems, long-term solutions "must derive from the establishment of close working relationships between universities and industry."

For example, "industry could make its unique research facilities available to university faculty, offer sabbatical year arrangements whereby university faculty would engage in industry research while industrial engineers and computer specialists taught and conducted research in university departments."

Universities could allow faculty more liberty to supplement their incomes and gain access to specialized research facilities in industry. Corporations could offer assistance to schools in return for university research.

However, the report noted "there is some evidence that current tax, patent, antitrust and copyright laws and regulations are creating barriers to more effective university/industry cooperation."

Finally, because of "the dramatic changes" in computer technology and its applications, the report argued for "engineering curricula that provide a broad conceptual foundation in addition to training in specific techniques and thus provide new graduates with the capability to retrain themselves in fields that may be somewhat different from those of their original major."

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The amount of job-control language that can be used on an OS system is overwhelming. There are more parameters than you would ever want to know about; and those parameters let you do more things than you would ever want to do.

Of course, the IBM manuals are designed to tell you all there is to know about OS JCL. But that's what makes it so frustrating when you have to code the JCL for a new application. When you look up a function in the manuals, there are often pages of detail that don't apply to your situation...or do they? It's hard to be sure from the few examples shown. So you end up figuring things out on your own, through trial and error or by consulting the JCL "guru" in your shop. Either way, you avoid coding new applictions in JCL whenever possible...they're just too much trouble.

Unfortunately, most "training" courses and texts on OS JCL are no better than the manuals they're supposed to explain. They get so wound up in complex details, without ever showing real-life examples, that you don't learn much. Then, when you want to know how to code a specific function, it's back to the manuals and the trial-and-error process.

Now, though, I'm happy to announce a new textbook that concentrates on the practical use of OS JCL. It doesn't try to teach you everything there is to know about the subject. But it *does* teach you how to code the JCL for applications that occur every day in an OS shop. For example, you'll learn to execute utility, sort/merge, language translator, and link-edit programs. You'll learn to create, maintain, and execute JCL procedures. You'll learn to code JCL for handling sequential, direct, ISAM, and VSAM files. You'll learn what JCL to use on virtual storage systems. What's more, you'll learn to use time-saving techniques that can reduce coding errors. And you'll be introduced to a standard method of "structuring" your JCL code so it's easier to read and modify.

2 reasons why this book is effective

1) Probably the most important feature of this book is that it contains hundreds of illustrations. You won't just read about the JCL to use for a certain application; you'll see an actual JCL listing that you can use as a model for your own code.

For example, there are listings that show how to: use the IEBUPDTE utility to create and modify OS libraries; execute compiler procedures for COBOL, PL/I, FORTRAN, and assembler language programs; create the required data areas for VSAM files; link various combinations of source and object modules; and much, much more. In our experience, examples like these, more than any other factor, determine whether or not a course is effective. And they are the missing ingredient in most JCL courses—and in the IBM manuals.

2) The educational approach used in this book is one we've found to be effective again and again. Quite simply, a complete subset of JCL is presented in the first three chapters. That means you can start coding the JCL for many applications right away. After this, all material is organized by function (using procedures, executing utilities, and so on). So after you've finished the first three chapters, you can go on to any topic you want to know about.

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Four 3800 Rivals Carry Suspected Carcinogens

By Tom Henkel
CW Staff

Four out of five alternatives to the IBM 3800 — a laser printer that uses a chemical that Environmental Protection Agency (EPA) tests have confirmed is a carcinogen — also contain chemicals suspected of causing cancer.

Burroughs Corp.'s B9270-35, Xerox Corp.'s 9700, Univac's 0777 and Uppster Corp.'s 6510 use either selenium or nickel in their photoreceptors. Both chemicals exhibit strong carcinogenic tendencies, but have not been tested sufficiently for the government to make a statement on whether they are, in fact, carcinogens.

However, the EPA, the Food and Drug Administration (FDA) and the Occupational Safety and Health Administration (Osha) all list selenium and nickel as possible carcinogens that deserve further testing.

The photoreceptor of the IBM 3800 contains trinitrofluorenone (TNF), a chemical listed by the EPA as a known mutagen [CW, Aug. 25]. Mutagens are highly suspected as a cause of cancer, but not all mutagens prove to be carcinogenic.

The difference between TNF and the other two chemicals, selenium and nickel, is the mutagen factor. The Ames test, used to identify mutagenic tendencies in chemicals [CW, Sept. 15], showed TNF to be a mutagen, but not the others. However, the Ames test is not perfect, and its results are often found to be faulty, an FDA spokesman said. The 3800 seems to be the fastest of the laser printers at 5.5 page/sec. It costs roughly $325,000, or $6,560/mo on a two-year lease; paper costs roughly $12,900/mo, according to a December 1979 survey by International Data Corp. (IDC). IBM charges a paper usage fee of 3.5 mills per foot.

Characteristics[1] \ Printer	IBM 3800	Xerox Corp. 9700	Honeywell, Inc. PPS II Series 800	Uppster Corp. 6510	Univac[6] 0777	Burroughs Corp.[7] B9270-35
Print Speed (Page/Sec)	5.5[8]	2	5	1.5	2.65	2
Purchase Price	$325,500	$329,000	$200,000[5]	$90,000	$364,000	$332,500
Monthly Lease (Lease Term)	$6,560 (2-year)	$7,300[3]	$6,835 (3-year)	$2,800 (2-year)	$7,000 (5-year)	$8,505[4] (3-year)
Paper Cost/Mo[6]	$12,900[9]	$12,300	$20,400	Not Available	$12,900	$12,300
Paper Type	Fanfold	Single-sheet	3,800-Ft Roll	Fanfold	Fanfold	Single-sheet
Chemical	TNF	Nickel-plated belt	Petroleum-based toner and paper	Selenium tellurium over metal	Selenium coating over metal	Nickel-plated belt
Printing Process	Laser	Laser	Laser	Fiber Optics	Laser	Laser
Special Paper Required?	No	No	Electro-graphic	No	No	No

1. Based on a monthly work load of 3 million pages.
2. Manufactured by Siemens AG.
3. Xerox charges a flat monthly fee of $7,300 plus a surcharge of 3.5 mills per impression. A monthly plan that offers 1 million impressions is available for $10,800 a month.
4. Burroughs charges an additional $2 for each 1,000 pages.
5. Honeywell's PPS II Series 800 is available in six different printing speeds. A spokesman said the model that most closely matches the IBM 3800 costs $200,000. However, prices range from $170,000 to $250,000. Likewise, lease prices range between $4,500 and $7,000 on a three-year basis. The lease price listed is for the model closest to the 3800.
6. Paper cost figures are approximations based on an International Data Corp. survey in December 1979.
7. Burroughs' printer is manufactured by Xerox.
8. IBM says its printing speed varies with the forms size. A typical 8.5-in. by 11-in. sheet can be processed at a rate of 215 pages per minute or 3.5 page/sec. There are 50 different forms sizes, IBM reports.
9. IBM charges a paper usage fee of 3.5 mills per foot.

Another difference between TNF and the other chemicals is that TNF is a man-made product while nickel and selenium are natural elements. In small quantities, both nickel and selenium are considered essential to life; in larger doses, however, all three chemicals exhibit strong carcinogenic tendencies, according to at least two toxicologists, MIT's Dr. Dale Hattis and the FDA's Dr. Kurt Biddle.

Printer Technology

All the laser printers that contain suspected carcinogens use the same basic technology. A charge apparatus places a negative electrostatic charge on a photoconductor — a belt or a drum coated with the chemicals in question. A toner is used to develop the image, and it is then transferred to the paper by placing a strong negative charge on the back of the paper and bringing it in contact with the photoconductor.

Honeywell, Inc. uses a somewhat different approach to the same problem. In its Page Printing System (PPS) II 800 series laser printers, Honeywell uses paper treated with a special plastic, a petroleum derivative. The paper is charged electrically, as opposed to electromagnetically, with a light source and a petroleum-based toner is used to develop the image, the firm explained.

This method eliminates the photoconductor, or receptor, from the printing process. Instead, the paper is the photoconductor.

The chemicals used in the Honeywell printer do not appear, at least yet, to be carcinogenic. While they are petroleum-based and therefore toxic, Honeywell maintained there is almost no chance of the user experiencing ill effects from its printer.

But how great a danger the other printers pose is difficult to ascertain. Although many government and academic scientists attest that TNF, selenium and nickel demonstrate carcinogenic tendencies, none can say whether prolonged use of laser printers constitutes a hazardous exposure to the chemicals.

"I'm guessing, but I can't see where there would be a real exposure risk from [laser printer] use," Biddle said, adding that animal tests have revealed a higher incidence of cancer when the subjects were given about 10 times the normal selenium intake of humans. Speaking specifically of selenium, Biddle said the amounts humans would receive from contact with laser printers would probably be far less than a dangerous dose.

Nickel is probably the same story, Biddle said, and Hattis agreed. He noted there are some cases of workers in nickel-smelting environments who show a higher than normal incidence of cancer, but said the higher rate cannot yet be pinned on nickel. The cause of the cancer may be fumes given off by the smelting process or a combination of other environmental factors, he explained.

Nickel also tends to promote allergic skin reactions in some people. That reaction — usually not serious or cancerous — suggests nickel is easily absorbed through the skin, the type of contact most likely with laser printers.

Both Hattis and Biddle — although neither said they knew enough about laser printers to be considered expert — pointed out that it could take 20 years before the carcinogenic effects of TNF, selenium or nickel are realized. Hattis added that the computer industry changes so rapidly that laser printers may not be around long enough to provide any quantifiable long-term effects.

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ELECTION '80

By Marguerite Zientara
CW Staff

When Ronald Reagan, Jimmy Carter and John Anderson face off in the Presidential election tomorrow, millions of voters will be casting their ballots electronically. Although 50% of the American electorate still uses the mechanical lever-type voting machines, increasing numbers of voting citizens have moved into the electronic age, and reportedly most are pleased with the method. As for voting jurisdictions that have switched from mechanical to electronic voting systems, the reasons most often cited are the need for speed and accuracy in the face of growing electorates.

Cost-effectiveness, too, is a factor: while lever-type voting machines cost several thousand dollars apiece, electronic voting machines sell for several hundred. Furthermore, the electronic voting units are easier to move around and store, and many of them generate their own audit trails. Here and on the next two pages is a random sampling of how electronic voting equipment will be used in locations around the country, ranging in size from Fort Bend County, Texas — with 54,000 registered voters — to Orange County, Calif., with more than a million.

• Orange County

SANTA ANA, Calif. — When Orange County's first electronic voting system reached its 15th year of service and became very slow and very costly to operate, it was time to look around for something new.

Since the manufacturer of the county's original system was since defunct, Orange County turned to Martel Systems, Inc., based in Costa Mesa, Calif., for its mark-sense voting system, according to Barbara Fox, assistant director of the general services agency.

First used in California's June primary vote, the Martel equipment posed "some transitional problems, but we're working them out for the November general election," Fox said.

Working out those problems entails "small debugging jobs, and developing some appropriate administrative procedures to use with" the system, she added.

Faster Tabulation

With "one million, one hundred" registered voters in the county, faster tabulation time was essential for vote administrators. Added speed has been realized, but as for overall reliability — "We plan to reevaluate and compare the system after the November election. We do expect that it will better meet Orange County's needs because we're a large county," Fox observed.

The county chose mark-sense voting in the first place, instead of punch-card electronic voting, because the method offers an audit trail, has pen and ballot together and shows a high degree of voter acceptance. "Martel is the only state-certified mark-sense system," Fox said.

In the county's more than 2,000 precincts, officials "box up the ballots at the end of election day and transmit them via security procedures to our central facility here," Fox explained.

"Then we run the precinct ballots through 90 vote tabulators, the output of which is magnetic tape." The tapes are then processed through the central computer facility, comprising two Univac Corp. 1110 computers — "programmed to run simultaneously in case one goes down" — with an 1160 backup machine "in case both go down," Fox added.

• Lynn, Mass.

LYNN, Mass. — With 43,000 registered voters, Lynn, Mass., has used punch-card-based electronic voting equipment from EVM Corp. of Newton, Mass. "for five or six years," according to Leo D'Entremont, chairman of the election commission.

While EVM is now a dealer for Computer Election Systems, Inc. (CES) of Berkeley, Calif., it has been so "only for a couple of years," according to D'Entremont. "When we started using electronic systems, there were only two suppliers — EVM and CES."

"We wanted to get out of paper balloting because it entailed too long a process, and that left two options: Electronics or lever machines.

"I knew the council would not vote for lever-type machines because they were $4,000 apiece vs. a couple hundred dollars apiece for electronic voting systems, at the time," he recalled.

"Electronic systems at the time were 90% cheaper than lever machines, and we elected to go with the nearby EVM Corp. instead of the California-based firm," he noted.

With one voting machine for every 100 voters, the system also includes one IBM 2501 card reader, the output of which is then processed on the IBM System/3 computer "downstairs in City Hall," D'Entremont said.

• Palm Beach County

PALM BEACH, Fla. — In contrast to the mostly glowing reports from electronic voting equipment users around the country, Palm Beach County is still considering filing suit against Computer Election Systems, Inc. (CES) for its alleged failure to provide proper technical support and quality control [CW, April 28].

The possibility of a suit arose after CES' Alpha Ballot Tab system broke down the night of the March 11 Florida primaries, delaying election results 24 hours.

The breakdown — the second in two years for the system — followed a similar failure on election night 1978. On both occasions, the system crashed when its three Data General Corp. Nova II minicomputers went down, according to Election Supervisor Jackie Winchester.

Palm Beach County will use the CES system tomorrow and hope for the best. Although the county has not yet filed suit, "we're still dissatisfied," Winchester said.

Slight Problem

In a recent September election, there was "a slight problem" because a card reader did not work, she said. "It was giving incorrect counts; CES replaced the unit but never really explained to us what was wrong with it."

In October, however, the system worked "fine," she added. "It's all working now, and we hope it will continue for November."

In an effort to improve the system's reliability, CES has made some modifications, Winchester reported. "They put some shielding on the cables that connect [the equipment] together; they put some extra ventilating fans in the area where the CPUs are because they thought overheating might be causing problems like the boards going out; and some of the line filtering equipment has been modified."

Palm Beach County, with 310,000 registered voters, will use 2,400 voting machines for tomorrow's election. "We don't feel we can really assess the whole situation and decide what we're going to do until after the November election," Winchester said recently.

"Right now we're working night and day getting ready for that," she concluded.

• Lake County, Ill.

WAUKEGAN, Ill. — While Lake County, Ill., — with 235,000 registered voters — has utilized electronic punch-card voting machines since 1966, this election year has brought a switch from one vendor to another.

"Although we used the Votomatic machines from Computer Election Systems, Inc. (headquartered in Berkeley, Calif.) until this year, now we've converted to equipment based on the same principle from Election Data Corp.," based in St. Charles, Ill., explained Fred Boyd, Lake County elections administrator.

Besides the fact that the original equipment, put into use in 1966, "was approaching the point where it needed repair," according to Boyd, "we also needed additional units beyond what we had in inventory."

After examining the available machinery, "this particular equipment looked to be the most cost-effective," he recalled. "The price was right and the timing was right.

"We were actually able to replace our inventory and procure additional units for considerably less than our original investment," he noted.

Although tomorrow's presidential vote will be the first election in which the new equipment will be used, vote administrators do not anticipate problems. "I think the engineering of these units is really better than the original equipment we had and I really look forward to considerably less problems," Boyd said.

Engineering improvements over Lake County's previous equipment include an improved frame that holds the punch bed, better tolerances, better engineered stops for the template, stronger templates that are less likely to pop out of position, and a better shape to the guide holes in the template, according to Boyd.

In addition, "this unit is much smaller than the original equipment we had," Boyd indicated. "Because of the size, I'm able to package units together in the same container with other supplies going to the precincts.

"That offers real advantages in that it reduces the cardage people have to handle, reduces the number of cartons, plus it gives us a little better control."

Using 3,000 punch devices furnished by Election Data Corp., the electorate will cast its votes on cards that will then be processed by the election judges at the end of the day, Boyd explained.

"After preparing documentation to determine that they've accounted for all the ballots delivered to them, the judges of election will bring the cards to collection stations," he continued.

"The cards will be grouped at the collection stations and then brought to the central processing area where we'll verify the number of ballots being returned for each precinct, and then run them through two IBM 2501 card readers here," Boyd said.

"A processor program then translates the punches in the cards into election returns using our IBM Corp. 3031, running under DOS/VSE," he concluded.

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• Fort Bend County, Texas

RICHMOND, Texas — In contrast to the 1,000,100 registered voters in California's populous Orange County (see related story), Martel Systems, Inc. also supplies its mark-sense electronic voting system to tiny Fort Bend County here, with 54,000 registered voters.

While the county had paper ballots until last year, "the county was getting so big it was hard to count the ballots by hand," explained County Clerk Pearl Ellett.

With one optical scanning system for each of the county's 38 precincts, "which counts the ballots as they go through," according to Ellett, the county relies on telephoned precinct results, which are then manually tallied in the county clerk's office here, Ellett said.

• Hawaii

HONOLULU, Hawaii — If your image of Hawaii is one of a lazy island paradise that is slightly behind the times, think again.

In the vanguard, at least in the area of electronic voting, Hawaii happens to be the only state that is computerized statewide for those big election days.

With 4,000 punch card voting machines purchased from the Datavote Division of Diamond International Corp. in San Francisco, Hawaii serves its 400,000 registered voters, as it has since 1971.

"Back in 1968, we were faced with a problem because of increasing numbers of people in the state," explained Morris Takushi, Director of Elections for the state. "Three-fourths of the state was using paper ballots and one-quarter was using mechanical voting machines.

"We knew the paper ballot was on the way out, and we were fairly well pleased with the voting machines," Takushi recalled. "However, the voting machines were very expensive.

"When Datavote came on the market, we found that with a very small amount — around $50,000 — we could get a pilot program started," he said.

Growing Electorate

By 1970, the island was pleased with the experimental system and found itself, again, needing more equipment because of a growing electorate, Takushi recalled. "An Election System Advisory Committee was formed — including organized partisan and non-partisan groups — which called in all the major vendors and made an analysis of their systems," he said.

With Datavote the winner, Hawaii went statewide with electronics for the 1972 elections. "We finished the entire count by midnight, our time," Takushi noted.

Besides the "tremendous accuracy" of the system, proven time and again against manual recounts, according to Takushi, voter acceptance is very high for the system. "In a poll taken after the 1972 election, 97% of the voters said they were pleased with the system."

As for the computer equipment used to tabulate the punched cards, Hawaii uses "whatever is available" on the seven inhabited islands. "The equipment has varied because the neighboring islands [to Hawaii Island] are behind in technology," he noted.

"We once used a Data General Corp. minicomputer on the Island of Kauai, but now all the equipment is IBM," he noted. Tomorrow's election will be the first time the islands are standardized with IBM equipment.

"By 1982, we will be even more standardized," Takushi predicted, "because the state will have its own computer facilities on all the major islands, and they will be linked by teleprocessing for the transferring of results to the Election Center in Honolulu.

"Now, we have to phone in results from the neighbor islands to Honolulu, and then manually insert the counts into our IBM 3033 for the statewide totals," he explained.

"The next day, computer tapes arrive from the neighbor islands, they are fed into the computer system and we compare the manual and automatic counts," Takushi said. "They always match."

CBS Coverage Inaugurates Graphics System

NEW YORK — If you watch CBS News' coverage of the presidential election returns tomorrow, you will witness the network's inaugural use of its newly acquired Ampex Corp. Ampex Video Art (AVA) graphics system.

Developed by Ampex with the assistance of CBS, AVA reportedly permits the graphic artist to create original art or modify existing pictures, charts or diagrams with the broad selection of colors, hues, saturation, line weights, shapes and intensities.

While the AVA system gives the artist fewer tools to work with — gone are the X-Acto knives, paste pots, straight edges, paints, pens, pencils and brushes — it offers "more creative possibilities than were ever available before in the video medium," according to Donald Kleffman, general manager of the firm's audio-video systems division.

In place of such traditional artist's materials will be an electronic stylus and palette that directs the system's Digital Equipment Corp. PDP-11/34 minicomputer to paint or draw the art, Kleffman explained.

On election night, the system will be used to create pictures, charts and drawings that depict the night's activities.

Electronic Tablet

To use the AVA system, the graphics artist sits at an adjustable flat surface called an Electronic Tablet that is divided into two working areas. Two CRT monitors face the artist.

On the left, the color monitor displays the artist's work. The right-hand "menu" monitor lists a large number of different verbal commands that allow the artist to select a variety of painting and sketching styles, colors and special effects, Kleffman explained.

Using the electronic stylus, the artist draws and communicates with the AVA system on the two halves of the palette before him. The stylus is used to select various operating modes — using plain English commands — from the menu monitor. Touching the stylus to the palette causes a video cursor to be shown in the corresponding area on either the picture display or the menu monitor.

Slight additional pressure activates whatever command has been given to AVA, and artistic work on the palette's drawing area can proceed.

Multimodel Pseudomedia

AVA is said to permit the artist to paint in "any number of modes that resemble such media as watercolor, pencil, acrylics and pen and ink." The artist can select "brushes" varying from very thick to delicately thin, and create new brushes and store them permanently in the computer's memory for future use.

The artist can choose from 256 colors and six basic painting modes — opaque paint, tint paint, value paint, picture paint and two softening modes. Additional color palettes can be stored in memory for use as desired, as well, Kleffman explained.

If captions or headlines are needed, nine type fonts are available to provide the desired lettering style, color and size. In addition, the system offers predrawn shapes such as squares, circles, rectangles and ellipses. Entire sections of a picture — such as the sky — can be colored automatically with a touch of the stylus.

Once the art is completed, it can be broadcast immediately, recorded on video tape, stored in memory, or run through a photocopy printer to produce a hard-copy sample of the work.

AVA is said, in short, to eliminate the time-consuming process of creating board art, photographing and processing a 35mm slide, then creating a video image through a film chain.

"This system offers unparalleled opportunity for creativity," commented George Shannon, vice-president of production facilities and engineering for CBS.

"Traditional television graphics systems limit the artist's images to fairly simple geometric shapes, while AVA actually expands the artist's horizons," Shannon added.

Besides the PDP-11/34 minicomputer, the system comprises an Ampex DM-980 or DM-9160 computer disk drive.

Graphics artist sits at Ampex Corp.'s AVA graphics system. The color monitor on the left displays the artist's work, while the right-hand "menu" monitor lists a number of verbal commands for selecting numerous painting styles, colors and special effects.

• *Alaska*

JUNEAU, Alaska — Still considered by many to be the last frontier on earth, Alaska has nevertheless blazed its own trails into the most up-to-date methods of voting available.

Starting back in 1970, Alaska contracted with the Datavote Division of Diamond International Corp. of San Francisco to use its punch card-based voting system.

In 1974, the system was expanded to serve the three most populous areas of Alaska — Fairbanks, Anchorage and Juneau — which it has done ever since, according to Director of Elections Patty Ann Polley.

With 170,000 registered voters in those areas — "well over half the number of voters registered in Alaska" — the state uses "about 1,600" punch card voting machines on election day.

"After the polls close, the ballots are removed from the ballot boxes [in each precinct], put into containers and transported to computers in the three main cities for actual tallying," Polley said.

All the computers are from IBM, but are different models. "The ones in Anchorage and Juneau are very similar to each other, and the one in Fairbanks is the smallest," Polley said.

'Overall, Delightful'

Datavote has been "overall, delightful to work with, and has given a great deal of assistance to us when we've needed it," she noted. While there have been "no problems" over the years, she said, "One year we had a printing problem with the ballots, but it was something we did to ourselves — we can't simply blame them for it."

Why did Alaska go electronic in the first place? "Simply not being able to handle the hand-marked paper ballots and the hours of counting they were requiring" were the reasons, Polley recalled.

And, since the municipality of Anchorage at the time owned "30 to 40" lever-type machines that "nobody in the state liked," Alaska started looking at punch card systems.

"In the lever-type machines, [we objected to] the way they handled the voting, the way the counters apparently didn't work — and we were totally unhappy with that and knew we didn't want to go in that direction," she said.

The main reason the state chose Datavote over other suppliers was that "the ballots can be read by the eye without additional requirements or anything in conversion," Polley said.

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SBS Plans Nov. 12 Blast-Off for First Satellite

By Brad Schultz
CW Staff

ATLANTA — Barring an 11th-hour hitch in plans, Satellite Business Systems (SBS) will launch its first satellite for specialized common carrier services on November 12 at Cape Canaveral.

The podium masked whether SBS President Robert C. Hall crossed his fingers when he made that announcement at an international conference on computer communication session here last week. The man who once ran all DP and telecommunications for the New York and American stock exchanges seemed especially bullish.

SBS had to scrap plans for having the National Aeronautics and Space Administration's Space Shuttle place its satellites in orbit when technical problems such as tiles falling off the Shuttle's hull made that method impractical [CW, July 21].

Instead, a McDonnell-Douglas Co. Delta rocket, considered the most reliable vehicle in the U.S. Space Program, will allow SBS to start providing all-digital services early next year, Hall told the session. The Delta is estimated to have better than a 92% chance of successfully putting the first SBS satellite in geostationary orbit, he said.

Just in case, SBS bought launch insurance to cover the 8% risk. This was "an approach found to be prudent by our predecessors," Hall explained, several months after another carrier saw a satellite it wanted to place in orbit unexpectedly veer towards other sectors of the cosmos.

By April and perhaps as early as January, SBS will orbit a second satellite, a replica of the first, that will serve as a spare facility. A third satellite will be held as an "on-the-ground spare," Hall said, until launching in 1983 when customer traffic volumes fill the first spacecraft's capacity and expand into that of the second.

By 1983, SBS also intends to complete designs for the next generation of its satellites and start preparing to launch them in 1985 or 1986.

"The satellite may be the heart of the SBS system," Hall observed, "but the brains are on the ground." SBS will sell complete communications services, he said, including the earth stations necessary for satellite links. The company will not handle customers that acquire earth stations from another source and want those antennae to access the SBS services.

Private, Switched Nets

The initial SBS service offering, called the Communications Network Service (CNS), provides private, switched networks for large organizations, Hall stated. For DP users, CNS will allow remote copying of large files for the first time, he claimed.

At 56K bit/sec — the top speed of conventional data networks right now — a user would need almost two days to transmit a one-billion-byte file, which might be the daily sales transactions for a large retailer, Hall maintained.

SBS services will let the user transmit a one billion byte file in an hour and a half at 1.5M bit/sec or in 23 minutes at 6.3M bit/sec, he asserted.

"As a result, we expect many of our users to routinely update and replicate files overnight when the transmissions capacity of their networks is not needed for the voice and other daytime priority uses."

The first customers of SBS, which has yet to provide any services in its five year history, include IBM and Aetna life and casualty — which share ownership of SBS with Communications Satellite Corp. — as well as Boeing Computer Services Co., the Travelers Insurance Companies and Isacomm, a subsidiary of Insurance Systems of America.

Isacomm will be a value-added reseller of SBS services to the insurance industry, Hall pointed out. Travelers' initial SBS data network will run at 1.544M bit/sec.

CW at ICCC

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To West Coast, Overseas

Substantial Intelpost Expansion Predicted

By Phil Hirsch
CW Washington Bureau

ATLANTA — Intelpost, the international facsimile service recently launched by the U.S. Postal Service (USPS), may be substantially expanded within the next year, one of the system's developers said here last week.

Gov. Jerry Brown of California has written Postmaster General William F. Bolger, asking for establishment of an Intelpost pickup and delivery center on the West Coast, explained Helmo Raag, director of electronic mail systems at Communication Satellite Corp. laboratories.

His organization developed the system under contract to the Postal Service and is providing technical support on a continuing basis. The West Coast center would supplement the Intelpost centers already established in New York City and Washington, D.C.

"Some oil companies are interested in connecting their private communication networks directly to Intelpost facilities," Raag reported. In addition, the Netherlands has indicated that expansion of Intelpost to additional serving post offices within the U.S. would make it much more useful, since only about 20% of the mail which the Dutch send to this country is addressed to cities on the East Coast.

Because of these developments, USPS is "very conscious of the need for establishing additional Intelpost centers," Raag said.

Overseas Expansion?

The big question at the moment is whether or not U.S. Intelpost service will be expanded overseas. Currently, messages are being exchanged only with Canada, mainly because the Federal Communications Commission (FCC) has refused to let U.S. international record carriers (IRC) lease overseas circuits to the Postal Service.

The commission says such a lease would violate a long-established rule barring resale of international communication facilities. The commission recently proposed doing away with this rule, and may finally decide to do so shortly.

In the meantime, USPS has said that if the restriction is not lifted, it will offer Intelpost service overseas via Canada.

Raag, who was interviewed here at the Fifth International Conference on Computer Communication, said shortly after speaking at one of the sessions that the negotiations are now underway, although he does not know how soon service overseas will begin.

He also indicated the real problem may be U.S. IRCs, rather than the FCC. One international carrier — RCA Global Communications, Inc. — offers a facsimile service called "Q-Fax" that competes directly with Intelpost, and the others probably consider Intelpost customers prospects for their international telex offerings.

Conflict Abroad

There is also some conflict over Intelpost abroad, Raag said. Mainly it involves rivalry between the postal and telecommunications arms of foreign postal, telegraph and telephone administrations (PTT).

Each organization resists the other's efforts to control technical and operational details of the service. However, Raag said that efforts are now underway within international postal and telecommunications organizations to resolve this conflict.

While implementation of Intelpost by the U.S., which developed the basic concept, has been hobbled by regulatory delays, several other countries have begun commercial field-trials of the service or will do so shortly. They include Canada, Argentina, Belgium, West Germany, France, the Netherlands, Switzerland and the U.K. Both the French and the West Germans, Raag reported, are planning to connect analog, low-speed facsimile machines directly to Intelpost centers via dial-up telephone lines.

The Communication Satellite Corp. laboratory is working on a number of other enhancements — laser-driven printers, for example, and smaller-scale versions of the terminal equipment now installed in Washington, D.C. and New York, which might be used in smaller cities, or at multiple post offices within a large city, to make Intelpost more accessible to the user. The Comsat Laboratory is also developing encryption, priority-assignment and network traffic control enhancements.

Although Intelpost employs a packetized transmission scheme, the packet formats do not conform to X.25, the international communication protocol standard. Instead, the service uses a protocol known as TCP, developed by the U.S. Defense Department's Advanced Research Projects Agency (Arpa). Conversion to X.25 and related standards is "under study," Raag reported.

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From Technologist to Generalist

Changing DPer Role Seen Leading to Big Bucks

By Ann Dooley
CW Staff

PHILADELPHIA — The role of the DP manager will evolve in the 1980s from the technologist to the generalist and computer professionals should concentrate on cashing in on the accompanying "big bucks," according to Dr. Stephen Ruth.

Speaking at the annual International Data Processing Management Association (DPMA) conference held here last week, Ruth, an associate professor of decision sciences at George Mason University, Fairfax, Va., outlined some of the issues that will be confronting the computer professional over the next decade.

Ruth noted that managers will find themselves dealing with more staff grievances as computer professionals become more confident about making demands. Personnel will continue to become more mobile and the best people will be the ones moving most, he said. In the '80s more continuing training and discipline will be necessary for computer professionals and expertise will become more fragmented and specialized than ever, he predicted.

As DP people earn larger salaries for lower-level jobs, fewer people will be willing to take the responsibilities of leadership, Ruth claimed. At the same time, professionals will face an increasing demand for higher productivity, he said, and managers will find themselves forcing their staff to constantly increase their productivity.

Vendors, too, will undergo changes over the next decade, Ruth predicted, noting that more disputes will arise between user and vendor.

Users will be forced to buy packages that will result in packaged managers, he said. Managers will find that because of the continued dominance of packaged software, systems will have to be changed to fit the package rather than the other way to customizing a package.

CW at DPMA

Administrative changes will also occur such that as the information processing function becomes more important, the manager will either have responsibilities dispersed or the job upgraded, he said. DPers will no longer be treated differently from the rest of the corporation, but will face the same kind of return on investment demands, Ruth warned.

On the same note, the DP department will be regarded as an overhead function and corporate executives will no longer view it as saving bottom-line costs, but rather as a way of increasing profits, he stated.

The '80s will see hardware improving in cost ratio while software will continue to be more expensive, Ruth predicted. Neither home computers nor the Office of the Future will make much of an impact over the next decade, although word processing and data base administrators will become increasingly important.

Manager Salary

Ruth also outlined how managers can write their own salaries.

Managers first must become conspicuously more dollar-oriented and show an obvious concern for a return on investment — something that most DP departments have never been involved with, he stated.

Ruth also told the managers to constantly study the technology that is available. Additionally, managers should always remember to act like managers, he stated. This means dressing properly and displaying the proper attitude, he noted.

Managers should educate themselves about new issues and become experts so that others will have to rely on their knowledge, he advised.

They should not lock themselves into one position, but be open to a number of different career paths — and let people know about it, he said.

Maintaining one's own work and the department's work at a certain level, and spending a lot of time of the planning stage of any project should also be part of the manager's program, he advised. And a manager who wants to increase his salary worth should work incrementally each day toward a specific goal, Ruth stated.

Micro-Based System Tracks Pikes Peak Juvenile Cases

COLORADO SPRINGS, Colo. — To coordinate and prevent duplication of 7,500 juvenile infractors' records that are processed annually from reports of 23 agencies and services at the Pikes Peak Area Council of Governments here, the council bought a microcomputer.

"Before we did this, we didn't know whether it was one very busy kid or 7,500 kids being processed," said Jan Wellman, the council's criminal justice coordinator.

The term "infractors" is used rather than "criminal" because records of noncriminal cases, like runaways and subjects of child abuse, are also processed.

With a grant from the Law Enforcement Assistance Administration (LEAA) Wellman bought an Apple Computer, Inc. Apple II Plus with an internal memory capacity of 48K bytes and two floppy disk drives. In addition, he purchased a Corvus Systems, Inc. hard disk with 10M bytes of memory, a Sony Corp. videoscope and a Datasystems Corp. Paper Tiger printer.

The Corvus hard disk allows for five to eight years of storage capacity at 255 characters per record.

Initially the council had planned to rent time on the University of Colorado's computer, but the cost of one year's rental was equivalent to the system it eventually bought.

The LEAA grant of $72,250 runs until 1982, so the project would have been short-lived. As it is, Wellman predicted that local services that will benefit from using the organized records will be able to contribute to the cost of running the system, which he estimates at $5,000 per year.

A local software house provided a file management program and the council's systems analyst, Peter Sencenbaugh, wrote more programs.

Anyone outside the office who wishes to review the records must receive the judge's approval beforehand by establishing that it is for "meaningful statistical research."

After Fire Destroys Systems, Business as Normal in Days

ARLINGTON, Texas — After a fire destroyed the offices and computerized reservation and ticketing equipment at Dan Dipert's Travel Services, Inc. here, business was back to normal within days.

Dipert had moved into new buildings specifically designed to house the computer equipment installed six weeks ago. This consisted of five programmable terminals from Raytheon Data Systems Co.'s PTS 100 range and two Raytheon printers which were part of American Airlines, Inc.'s Sabre system.

"Immediately after the fire they began working to try to get our system in operation," Dipert said. "They got us back in working order within days and we were very pleased with the service," he added.

American Airlines' Sabre is installed in about 2,800 travel agencies nationwide according to Max Hopper, vice-president of DP and computer services for American Airlines, Inc.

"We have an emergency reporting system for any kind of failure and we automatically dispatch servicing staff," Hopper said.

Dipert had to replace all his printers and terminals and said he was pleased with the quality and speed of the service provided.

American Airlines was among the first of the large carriers to offer automated reservations and ticketing services to travel agencies in 1976. The Semiautomated Business Research Environment system pioneered by American Airlines in the early '60s was the first system to link passenger names to seat numbers, Hopper said.

In most cases it uses Raytheon terminals that link up with IBM 3033 and Amdahl Corp. 470V/8 mainframes.

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Sitting on Sidelines Held Ill-Advised for DPers

By Ann Dooley
CW Staff

PHILADELPHIA — The DP department cannot sit on the sidelines any longer and wait for a call from top management if it wants to be taken seriously.

In order to be integrated into the corporate structure, a DP manager must carve a place for himself and his department in the planning and implementation processes from the beginning, a panel of top executives at the annual International Data Processing Management Association (DPMA) conference concluded here last week.

CW at DPMA

Examining how top management perceives information processing professionals, the panel of non-DPers maintained that computer professionals have a lot of work to do.

Most executives even now indicate they don't believe that DP managers are able to be promoted to top-level positions within the corporation, they indicated.

Leery Executives

Although information processing is spreading into every aspect of a corporation, top executives continue to be leery of DP professionals and pigeonhole them as "those technical people," James McKenna, a panel moderator and vice-president of American Management Associations, noted.

Corporate executives maintain certain beliefs that DPers have frequently helped perpetuate, he noted. Computer personnel are generally considered more loyal to their profession than to any one company and are therefore unlikely prospects for promotion outside of their technical expertise he asserted.

Corporate executives often consider computer managers technically oriented and many still have difficulty understanding them or what it is they do, according to McKenna.

The executives also feel that computer professionals tend to isolate themselves from the rest of the corporation, but at the same time feel it might be for the best.

These attitudes have historically been perpetuated by DPers and "it's time to stop," McKenna stated.

Help CEO

Every information processing manager should examine his department and ask to what extent it is helping the company's chief executive officer (CEO) with corporate planning, according to Robert McLean, executive vice-president of Insurance Co. of North America. DP has increased communication, but hasn't increased corporate overall productivity, he asserted.

In order to integrate DP with corporate authority, the information processing manager must learn the business side of the corporation, he said. The DP manager also has to institute human interest plans by going out into the field and talking to users and communicating short- and long-range plans, McLean said.

Managers have to develop people-efficient rather than system-efficient systems, as well as involve and gain the commitment of top management, McLean said.

Dependent on DP

Users often feel themselves at the mercy of their DP department, dependent on it for data and efficient communications in order to do their own work, and this breeds tensions, according to Thomas Plaskett, senior vice-president of marketing for American Airlines.

As a corporate user of information processing Plaskett noted that he expects the DP department to provide faster response time in implementing system changes, develop more flexible designs, provide a better understanding of strategic planning for the company and find ways to expand the skills of DP personnel.

Plaskett also noted that the DP department has to work harder to include the user in the design and implementation or else it will be spending all its time redesigning over and over again.

John Ryan, president of Sun Information Services Co. said that as a user of information processing, he expects computer professionals to provide knowledgeable support to business.

Ryan, unlike the other panelists, advocated more decentralization among the information processing department and the rest of the company and told the audience that the most important thing to remember is that productivity should be their overriding theme.

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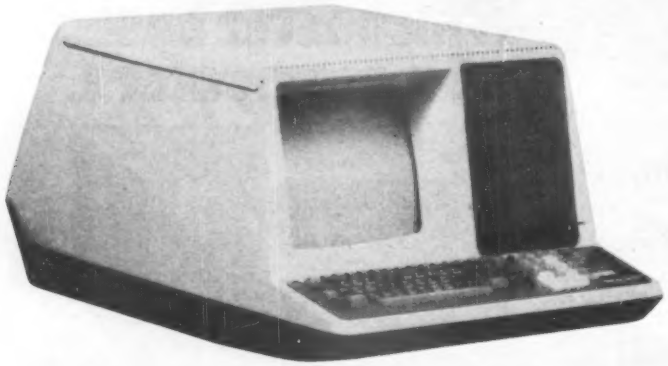

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Computerized Van Meters Southern Public Opinion

ATLANTA — A computerized, customized van is currently touring 10 Southeastern cities surveying public opinion, caught up in the election-year polling fever epidemic.

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"The Merit Report," conceived and promoted by Philip Morris, Inc. for Merit cigarettes, is advertising taken one step further.

Apple-Equipped

The van, equipped with four Apple Computer, Inc. Apple II microcomputers and Anadex, Inc. printers, parks in a city for six days. On average, 1,200 people pass through the vehicle each day, according to Cathy Leiber, the project director.

Three people can be polled at one time as they stand in front of three CRT terminals. Ten questions flash on the screen including such topics as the Olympic boycott, oil prices and the death penalty.

The people make their choices and the fourth Apple II micro then tabulates these to show how an individual compares with all the other opinions cast that day. The printers provide hard-copy analyses for the polled people to take home.

"The promotion was an internal idea and we did a great deal of research," Leiber said. "We wanted to use computers that would travel well."

Leiber said the project has received good response to date and, if this continues, nine more vans will be fitted to poll the rest of the country next year.

Each customized van costs around $150,000.

Dangers of New Technology

On-Line Technology Seen Promoting Deception

By Phil Hirsch
CW Washington Bureau

ATLANTA — Although on-line information systems are growing and may be more cost-effective than face-to-face meetings in some cases, it is also possible that the new technology promotes "deception and concealment."

This is one of several hazards posed by the sytems now beginning to proliferate within the world's developed nations, according to Prof. A.S. Douglas of the London School of Economics. He delivered the keynote address here last week at the Fifth International Conference on Computer Communication (ICCC).

Another danger is posed by the software being developed to support on-line information systems, he added. The quality of the information supplied depends "materially" on this software, but "the technology needs considerable development."

There is considerable uncertainty about ownership of the information stored within on-line data bases, and "such legislation as exists has not yet been fully tested in the courts. International traffic in information is so voluminous that an attempt to monitor it to detect violations of international conventions is probably impracticable, even if it were regarded as politically desirable," Douglas said.

The impact of on-line information systems on employment is another problem that has not been addressed adequately, he added. It is not only that on-line systems are likely to reduce jobs in the 1980s, particularly for office workers, but also that many of those who remain employed will gain increased bargaining power.

"Even if we understood exactly what aims we should serve by the changes impending, there still exist some very real problems of implementation," Douglas pointed out. "We are no longer dominated by hardware considerations, by our ability to analyze and specify the systems we wish to set up and by our ability to construct the programs for the computers embodied in the networks specified.

"Both software engineering and systems analysis are relatively new subjects. Moreover, the techniques developed are continually lagging behind the requirements placed on them by enthusiastic salesmen.

"No sooner do we develop compilers for simple languages than we are required to design and implement more elaborate languages and add a programming environment module. Relative to the march of external events, software research workers have had to run at breakneck speed to stay still."

A related problem is the lack of an acceptable query language and the need for further network standardization. X.25 "only deals with a part of one level of the protocols needed to provide trouble-free interconnection between data bases or their partitions over public switched networks," Douglas pointed out, "Moreover, not all existing implementations of X.25 are completely consistent. I have no doubt that much more will be heard of standards and data base. problems in the 1980s."

CW at ICCC

Implementation Problem

Perhaps the most difficult implementation problem involves the question of government regulation. Douglas argued that unrestricted competition "is impractical, if only because of the need for a higher authority to regulate use of the radio spectrum and prevent one or a few suppliers from monopolizing the market."

However, he quickly added that government regulation has serious drawbacks: Because of it, the communications industry has become "cooperative if not monopolistic and reluctant to move to new methods."

On-line information systems may alleviate this problem by helping the voter "both inform himself better and inform his representatives better. Even this, though, has its snags. No ship can steer a straight course with many hands on the tiller, and the ship of state with some 200 million hands all trying to steer at the same time would be likely to behave somewhat erratically."

Legislation Held Right Way To Run Communications

By Brad Schultz
CW Staff

ATLANTA — Even though the proposed law to rewrite the Federal Communications Act has died, legislation, not a court decision, is the right way for government to address the data communications industry in the public interest.

This opinion was expressed by Henry Geller at the International Conference on Computer Communication here last week.

Appearing at the conference keynote session, Geller, head of the Commerce Department's National Telecommunications and Information Administration (NTIA), described as "sound" the Federal Communications Commission's (FCC) decision in Computer Inquiry II — the regulatory agency's second attempt at deciding how to handle AT&T's DP ventures. However, the ruling "does not represent as good a policy as does the more far-reaching legislation" contemplated this year.

Similar Action

Similar to the actions proposed in Congress, the commission called on AT&T to cast off its computer equipment manufacturing operations as a fully separated subsidiary, the Commerce official said, but in contrast to the legislation the commission mandated less protection against Bell subsidizing these operations with revenues from its telephone side.

The FCC found such cross-subsidization to be anticompetitive, preventing much smaller suppliers from exercising what the commission considered their more legal right to participate in the marketplace.

The NTIA will ask the FCC to levy more constraint on AT&T against cross-subsidization, bringing the commission's position closer to that of the bills Congress failed to pass.

But the FCC probably will not cooperate, he speculated. On appeal filed by Bell, "the matter will then shift to the courts" and attempts to revise the 1934 Communications Act will stall pending the litigation's outcome.

If, as NTIA prefers, the FCC wins in court, the DP industry will have lost ground, Geller remarked, relative to the situation if Congress actually approved this year's rewrite bills. But the industry will also lose if the court decides against the commission in reviewing Computer Inquiry II because AT&T will push for passage of milder bills, he maintained.

Bell Argument

The company will argue that fewer restrictions should be legislated because it has already undergone substantial reorganization in compliance with FCC orders, Geller explained. Meanwhile, Bell will continue offering products and services with an unfair advantage over independent carriers and communications vendors, he asserted.

Under either scenario, the only sure winner is the Washington, D.C., bar, Geller said. Lawyers also benefit from antitrust litigation that cites the 1956 consent decree that AT&T signed with the Justice Department, promising not to stray into the DP market place, he added.

Geller warned that legislation forcing AT&T to split into several independent companies, similar to the breakup of the Standard Oil trust early in the century, would engender the marketing of essentially equivalent products and services with little subsequent benefit to users or the industry.

Leased TRS-80s Balance Checks

KNOXVILLE, Tenn. — For a fee of $15 per month, checking account customers here can lease a TRS-80 personal computer to check the balance on their checking account, and which checks have cleared the bank.

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No One Cares About Past Victories

DPer-Turned-Manager Told to Change Focus

By Ann Dooley
CW Staff

PHILADELPHIA — Nobody cares about a manager's past victories in the technical field and the sooner a new manager realizes that, the better chance for success there will be.

While a technician-turned-manager does not have to forget about technical expertise, he has to realize his job is now primarily concerned with people, according to James Towsen, president of Towsen Associates, Inc., a consulting firm based in Harrisburg, Pa.

Speaking at the annual International Data Processing Management Association (DPMA) conference last week, Towsen stated that management is not for everybody. Completely new challenges and obstacles face the manager who has moved from technician to supervisor because the emphasis is placed more on people and less on data, Towsen told the management group.

CW at DPMA

To be effective, managers must find out what is important to employees. Most managers believe that money is the deciding factor in motivation, but that is not true, Towsen maintained. Job satisfaction and gratification rate higher than money among staff members, but every manager must determine for himself what sparks his staff, Towsen said.

Larger Issues

Towsen outlined to the audience some of the larger issues that new managers must deal with when working with people instead of data. Managers have to motivate their people, both for the morale of the staff and for the good of the company, he said. Time costs money and estimates show that 20% to 40% of the work force is working below capacity, he noted. Increasing motivation is obviously essential, he stated.

Employees also have pretty definite expectations of what they want in a manager, and it is up to the new manager to conform to them, Towsen noted. Highest on their list is honesty, he stated. Employees also expect their manager to be knowledgable, be able to establish working relationships, be loyal to the organization, show gratitude for work well done, back up an employee, be consistant, prepare staff members for larger responsibilities, ask for ideas and suggestions and give credit for a job.

Employees also have definite ideas about what they do not want to see in a manager, according to Towsen. Employees do not want managers to nitpick, delve into their personal lives, not listen or be unwilling to make a decision. Other negative points against managers are for those who can't be bothered, who are indifferent, bossy, sarcastic, complain constantly or take employees for granted, Towsen said.

Towsen stated that a successful manager is one who is willing to do what the unsuccessful manager would not even think of doing.

Handling Mistakes

A new manager is faced with a number of challenges and problems from the opposite perspective of a technician, Towsen noted. Managers can not afford to worry about who is to blame when mistakes occur, according to Towsen. Placing the finger of blame on an employee only sets up a negative reaction and when the next mistake is made, the employee will be more likely to try to conceal it than to solve it, Towsen said.

When a mistake occurs, the prime importance is to find out what happened, why, how it can be prevented in the future and how the present mistake can be corrected. "Get in touch with the problem but don't get out of touch with the people," Towsen noted.

Towsen stated that evaluation is always better than criticism. One is constructive and the other is judgmental he noted. If criticism is necessary, focus on the problem and not on the person and always try to suggest a remedy, he stated.

A new manager must also learn to explain changes to his staff and be ready to justify them, Towsen said. What the change consists of, why it is being made, who will be affected and when it will begin and end must all be explained to employees, he stated.

A good manager should also remember to follow up with reviews and reminders and then follow up again, he said.

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Europe Seen Quadrupling Packet Net Demand

By Phil Hirsch
CW Washington Bureau

ATLANTA — Although many European countries are building or planning packet-switched data communication networks, there may not be enough facilities available to meet the demand likely to develop during the second half of this decade, warned a telecommunications consultant here last week.

Overall, demand for data communication facilities will more than quadruple during the '80s in Western Europe, according to David Lewin, of Logica, Ltd., a British telecommunications consulting organization, which last year completed a $3.5 million study of data transmission requirements in 17 Western European countries. Lewin and an associate, Timothy Johnson, designed the study. They coauthored a paper, discussing some of the results, which was presented here by Lewin at the Fifth International Conference on Computer Communication (ICCC).

A major conclusion of Logica's "Eurodata '79" study is that use of the telephone network for data transmission will fall drastically, percentagewise, while use of public data networks — particularly those employing packet switching — will mushroom.

"Currently, nearly 40% of the network termination points in Western Europe are attached to telephone lines," Lewin said.

"By the end of the decade, that proportion will have fallen to less than 20%." The demand for lease circuits will grow "very much in line with the overall growth in demand for data communication," he added, while public data networks, which now serve about 3% of all data communications users in the 17 countries, will serve 30% by the end of the decade.

Lewin predicted that by 1987, "the demand for lines on public data networks alone will exceed the total demand for data communications now" in these countries.

Reasons for Switch

Partly, the growing popularity of data networks will be due to their availability. Today, such networks are found mainly in France, Germany and Spain. By 1982, only four Western European countries — Ireland, Portugal, Italy and Greece — will be without Public Switched Data Networks (PSDN), and by 1984, these countries also plan to have such facilities in operation.

But the main reason for the switch from telephone to data nets is that the latter provide a low-cost means of satisfying the user's basic transmission requirements. Lewin defined these as the ability to transmit specified volumes of traffic specified distances at specified speeds.

CW at ICCC

PTT Plans

Because of the tariffs which Western European postal, telegraph and telephone administrations (PTT) plan to adopt, circuit-switched networks will be cost effective for only a small percentage of the users, Lewin said.

Typically, these will be customers transmitting low volumes of data at 1,200 byte/sec or less from city to city. Those who need local transmission at these speeds will use the telephone network, he said, while those requiring high-speed local-or long-distance transmission will employ packet-switched networks or leased circuits.

However, because the tariff structures in the 17 countries covered by the Logica study vary widely, the popularity of individual transmission alternatives will not be the same from one country to another, he added.

Rising Percentages

The study indicates that by 1987, the proportion of all data communications users connected to packet-switched networks in individual countries will range from 21% to 38%. For circuit-switched nets, the percentage will be 3% to 32%.

Meanwhile, use of leased circuits and telephone networks will decline. In 1979, 54% to 94% of the data communications users within each of the 17 countries employed leased circuits. Logica estimates that by 1987, it will be 34% to 48%.

During this same period, telephone usage will drop from a range of 6% to 46% to 1% to 18%.

These projections assume that the PTTs will provide the facilities needed to meet the anticipated demand. But "in some countries, the demand for packet-switched networks far exceeds what the PTTs plan to supply," Logica said.

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Scientists Join Moratorium Against Soviets

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Almost 8,000 scientists from 44 countries have joined a moratorium on scientific exchanges with the Soviet Union to protest the treatment of their dissident Russian colleagues, such as imprisoned computer scientist Anatole Sharansky.

The moratorium, which began in May, will extend through the end of a conference in Madrid, Spain, early next year. The conference has been called to review compliance with the 1975 Helsinki Accords treaty, according to the moratorium sponsor, Scientists for Sakharov, Orlov and Sharansky (SOS).

The loosely knit, ad hoc SOS was formed two years ago after Sharansky was jailed for allegedly spying for the U.S., and physicist Yuri Orlov was arrested after he became chairman of the Moscow Helsinki Watch group, which monitors Soviet compliance with the human rights treaty.

By early 1979, SOS had gained the support of more than 2,400 U.S. scientists who pledged to curtail or end their participation in scientific exchanges between the U.S. and the Soviet Union [CW, March 12, 1979].

International Movement

The Oct. 16 press conference here announcing the status of the moratorium was called to note the growth of SOS support, especially the fact it is now an international movement. The sustained, international response to the situation of Soviet scientists at odds with their government is "truly unprecedented," SOS Chairman Morris Pripstein said.

Similar press conferences were held the same day in London, Paris, Rome, Geneva, Switzerland and Hamburg, West Germany. Scientists participating in the moratorium include 32 Nobel laureates, 187 members of the U.S. National Academy of Sciences, 82 Fellows of the Royal Society of London and a number of members of the French and Italian academies of science, according to the SOS list.

The duration of the moratorium will depend on what action is taken at the Madrid meeting, according to Pripstein, a Lawrence Berkeley Laboratory physicist.

The conference is slated to bring together representatives of signers of the Helsinki treaty, including the Soviet Union.

The SOS action serves as "a signal warning" to the Soviet Union, he said, that "future scientific exchange will be severely curtailed" unless there is "some significant restoration of elemental human rights for so-called dissident Soviet scientists."

Unknown Effect

Also appearing at the press conference here, Anthony Ralston, former president of the Association for Computing Machinery (ACM), said it is hard to tell what effect SOS has had on the treatment of the dissidents.

According to SOS, however, the number of scientists visiting between the U.S. and the U.S.S.R. during the first six months of this year was less than one-quarter of that for the corresponding period in 1979.

Ralston also suggested that recent hospital treatment for the seriously ill Sharansky, reported in the press last week, might have resulted from the publicity SOS has given the computer scientist's plight.

Addressing the computer science community's response to SOS, Ralston said the fact that Sharansky is a computer scientist has made his U.S. colleagues "more sympathetic" to the aims of SOS. A number of scientists and engineers from IBM, Burroughs Corp., Univac and other computer firms are participating in the moratorium.

'Conservative Group'

Ralston added there has been no SOS effort to target computer scientists, a "relatively conservative group," for participation.

He noted, however, that ACM members have expressed considerable interest in this issue.

The aim of SOS, according to Ralston and his colleagues who spoke here, is not to "choke off" all contact between the U.S. and the Soviet Union, but to urge scientists to act individually, in any way they see fit, to moderate their relationships with Soviet scientists.

Those sympathetic to SOS would lose any influence they might have with the Soviet Union were all interaction cut off, Ralston said. But the exchanges must "not be in a vacuum," according to Ralston, who said the Soviets must be made aware of the consequences of their oppression of dissidents.

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Typical 'Criminal' Profiled

Smart, Trusted Worker Viewed Likely Defrauder

By Rita Shoor
CW Staff

NEWPORT, R.I. — Who is the person most likely to defraud a company using one of its automated systems? Chances are it will be a trusted employee who is intelligent, gives the appearance of being a hard worker and is not directly involved in computer operations management, programming or systems analysis.

That is a general profile of many "computer criminals" who have been unmasked, according to Dan Horsey, an information systems consultant who conducted a session on "Fraud and Auditing Control" during the New England Computer Users Group (Necug) conference here recently.

Horsey addressed four questions on this topic, indicating that all of them should be considered by the installation manager who is concerned with computer system fraud control.

Major Concern?

First on the list was a question concerning the dimensions of the problem. There are several opinions as to just how much money companies lose because of computer-related crime. Loss estimates range from $140 million to some $1.8 billion each year.

If the larger number is reasonably accurate, "It's worth doing a lot to solve a problem of this magnitude," Horsey said. If, however, the total losses in this country are closer to the $140 million figure, it may not be worth "spending a dollar to save a dime."

The end user should also be aware that other factors, such as wrong input, reruns because of programming errors, "unneeded and unheeded systems" and simple waste, may actually be more significant in terms of cost to the installation, the consultant maintained.

So why continue talking about fraud? Because it does happen and "it's embarrassing if it happens to you."

The second question as to what can be stolen from a computer system elicited the answer that money, goods, competitive and/or saleable information and time were all possible commodities for the computer system thief.

Thirdly, the question of defining a likely culprit's characteristics resulted in the portrait of a trusted, intelligent worker. While he may not be directly involved with the computer system, he will take advantage of an existing system weakness and often operate in collusion with another employee, Horsey said.

The last question involved methods for preventing computer fraud and catching malefactors if the fraud is taking place.

Prevention is largely a matter of hiring honest people, according to the consultant. The employer should always check employee references and educational background.

It is necessary to know your employees, and show a genuine interest in what they are doing outside the office, how they live and who their friends are, Horsey warned the management information systems supervisors.

Horsey recommended that managers "show up when not expected" — on second shift, for instance, to discourage potential internal thieves.

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SMIS Slates Awards Event

CHICAGO — The Society for Management Information Systems (SMIS) has announced its 1981 Awards Competition, complete with $5,000 bounties, for the best papers describing significant contributions to the development and/or implementation of management information systems (MIS).

Papers should pertain to inplace, evaluated MIS activities, judged to have had a significant impact on the organization involved — a contribution to improved profit, service, communication and so forth. Relative telecommunications and word processing topics are also acceptable.

Abstracts of up to 1,000 words should be submitted by Jan. 15, 1981, to Robert Rouse, Center for the Study of Data Processing, Washington University, St. Louis, Mo. 63130. Papers should include a brief statement of the MIS work, its impact, the extent of its implementation and a list of senior managers who can be contacted to validate its impact.

Finalists in the competition will have their original papers presented at the 1981 SMIS conference and reviewed for possible publication in the *MIS Quarterly*.

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NSF Grants $4 Million for Local-Area Net

By Bruce Hoard
CW Staff

SEATTLE — The University of Washington Computer Science Department has been awarded a five-year, $4,122,983 grant from the National Science Foundation (NSF) to construct a state-of-the-art local-area network.

As envisioned by Prof. Jerre D. Noe, project director, and the four professors working with him, the network will be composed of approximately 30 high-speed node computers within the computer science building interconnected by an Ethernet-type protocol, or the real thing, depending on when it becomes commercially available.

The department's Digital Equipment Corp. VAX-11/780 and Decsystem 20 will be used as "file" or storage nodes while the system is still in its infancy. Noe was unsure about what larger mass storage devices will be used in the future.

The professor was equally uncertain about what specific machines will be picked to serve as nodes. He did say the researchers are looking for something with about 1M byte of memory and a CPU with a throughput capability of one-half to one million instructions per second (Mips).

One or more of the nodes will also serve as a link with other outside networks, he added.

'Although the system will not be that different from the Ethernet system "in terms of structure," it will be different in its quest to obtain a "logical unification" greater than that offered by Ethernet.'

Although the system will not be that different from the Ethernet system "in terms of structure," it will be different in its quest to obtain a "logical unification" greater than that offered by Ethernet.

By logical unification, Noe means a network node will have the ability to pick up extra computing power from other node machines that are not busy and are thus free to work on concurrent processes.

The hope is to have the process happen so smoothly that the user will be unaware CPUs are swapping jobs. "That gives us the benefit of a building-sized computer," Noe said.

Software as well as hardware will be mobile within the integrated network. In taking what Noe termed an "object-oriented approach" to the system, various software programs will also be swapped around, freeing up memory for other tasks.

Such methodology contrasts favorably with the autonomous systems currently in use, he noted.

The development schedule calls for the construction of a "throwaway net" to be used as an experimental prototype during the first year.

After a limited observation period, it will be dismantled in favor of the final product, which will begin to emerge during the second and third years.

The plan is to begin using the system for computer science research while it is still being developed, Noe said. He mentioned image processing and office automation as two of many areas that may be targeted for research.

IP Manager Runs Night Shift From His Home

NEW YORK — By having the master console installed at his house, one information processing (IP) professional is able to run his DP department's third shift from home.

While this may seem far-fetched, changing work habits for IP professionals are on the horizon, according to Richard Dooley, vice-president of RHS & Associates, Inc.

Dooley gave his predictions of the trends intensifying within the IP environment at an American Management Associations conference for management information services (MIS) managers held here recently.

Other trends in the not too distant future?

- IP professionals will be on good track for management positions. In the past, managerial ranks have been filled with managers from finance or international management ranks.
- Users will gain greater control of the IP function. "The 1980s will be the decade of user responsibility," Dooley said.
- DP development staffs will spend 30% of their time developing interfaces — a phenomenon not experienced a few years ago.
- Graphics are here. "War room thinking" is a reality today in some corporations.
- Training budgets for IP professionals will increase markedly, Dooley maintained, noting that a firm he once worked for had an MIS training budget of $12,000.
- Factory management, including robotics, will merge with IP.
- Buildings and offices will be designed as vehicles for delivering data. Interfaces to DP equipment will be part of the architectural design.

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Court Suits Expected

Texas Medicaid Contract Handed to Bradford

By Bruce Hoard
CW Staff

AUSTIN, Texas — In a controversial and confusing advisory opinion, Texas Attorney General Mark White has decided the Bradford National Corp. has a binding contract with Texas to process its $2.2 billion Medicaid program over the next four years.

White based his opinion on information supplied to him in the form of an inquiry from the board of the state's Department of Human Resources, which "awarded" the contract through a disputed oral agreement.

Electronic Data Systems (EDS) is taking the state to court this week over the decision. EDS is the parent company of the National Heritage Insurance Corp. (NHIC), which has held the contract since 1976. The company based its argument on the grounds that White formulated his opinion on insufficient information and has misinterpreted the law.

State statutes make it illegal for the attorney general to render an opinion based on any information other than that he is directly queried about.

What the attorney general did not consider was which company submitted the lowest bid and whether or not awarding of the contract complies with applicable state and federal statutes.

Contract Proposed

The controversy originated at a July 15 meeting of the three-person board, consisting of Chairman Hilmar G. Moore, William Terry Bray and Raul Jimenez. After hearing arguments from both Bradford and NHIC, Bray proposed a motion:

"Thus, I wish to make a motion that this contract be awarded to Bradford subject to successful consummation of a contract that would include maximum use of a Texas banking system with respect to the funding and which would include consideration not necessarily in the contract, but consideration during the contract deliberations of trying to specify some methodology for premium setting in future years."

Jimenez seconded the motion and Moore agreed, saying, "The chair concurs, unanimous choice."

EDS maintained that an oral agreement is subject to the intention of its formulators and the board's intentions have been misinterpreted. The board meant only to negotiate with Bradford toward a contract, not actually commit itself to a contract, an EDS spokesman said.

Moore agreed. The chairman, who along with his two colleagues received a hasty visit from EDS President Peter Del Col after the decision was reached, is now unsure about who deserves the contract, how it was awarded and what can be done to reverse it.

"I have some reservations as to whether they [Bradford] are the best company," he told *Computerworld*. "I can honestly say I did not know we were awarding a contract. I thought we were to begin negotiations."

Asked if the entire situation had been born of confusion, he replied, "I think that's rather accurate."

NHIC did a good job, he said, and several health providers, including the Texas Hospital Association, the Nursing Home Association and the Texas Medical Association, all wrote letters to the board expressing their support for the company.

The Human Resources Department can terminate the contract if it can show it is not in the best interest of the state, according to the attorney general. Moore professed he had no knowledge of how to do that, however.

What he did not say was that he received a letter from White informing him that if he attempted to hold public meetings over the issue, he and the other board members would be subject to suits from Bradford. That information was supplied by the EDS spokesman and confirmed by a spokeswoman for White. Thus the only door opened to redress was slammed shut.

Amidst the furor, Bradford is quietly preparing to take over the contract on Sept. 1 next year. "We see no reason for the court reaching a conclusion that would reverse the contract," Bradford Financial Vice-President Paul Biegal said.

Computer Degree Viewed No Career Guarantee

NEW YORK — A degree in computer science does not necessarily mean a later move into information systems management, if the experience at IBM is representative.

"Persons with computer science degrees are significantly behind those with other degrees in moving into management," said William R. Bradshaw, who chronicled this for IBM.

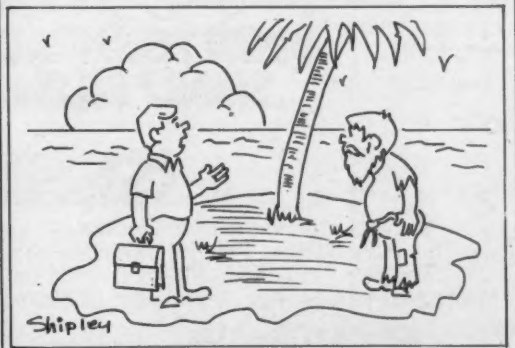
Bradshaw suggested the reasons for this are not all in yet, but that the computer scientists went into this field because they were not interested in management. Another factor is the computer science curriculum.

However, the number of employees with computer science degrees in the information systems at all IBM divisions has gone from 16% in 1970 to 44% in 1979.

Bradshaw, IBM director of information systems, described how IBM manages information systems personnel at an information systems strategies for the 1980s session sponsored by the American Management Association here recently.

In the mid-1970s IBM began formally surveying its information systems employees.

From that and subsequent surveys IBM learned that the employees' perception of the career movement in information systems was less than it actually was. Therefore IBM gave the career changes more publicity and emphasized they are, for example, moving to information systems within the controller's office, rather than simply to the controller's office.



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At One-Third Cost of Humans

Robotics Advances Aimed at Assembly Lines

By Connie Winkler
CW Staff

NEW YORK — Robots are being outfitted with vision, tactile devices and sophisticated hierarchical programming to make them even more successful contenders for assembly lines.

Today's robot costs about $4.80 an hour to run and participants at a recent conference session here on advances in manufacturing automation pointed to many coming improvements.

"Any manufacturer who ignores robots does so at his own peril," observed Joseph F. Engelberger, the father of American robot manufacturing. He is the president of Unimation, Inc. of Danbury, Conn., which was formed in 1958, produced its first manufacturing robot in 1961 and only became profitable in 1975.

Today's sophisticated robot, programmable to do a variety of tasks, costs about $40,000, but can work two and sometimes three shifts, Engelberger pointed out. That $4.80 an hour is about one-third the human cost.

All the speakers emphasized the human worker is still impossible to duplicate; there is no way to mechanically duplicate a hand, for instance.

Foreign Impact

Engelberger said he is regularly asked why Japanese manufacturers use more robots. Unimatic's Japanese licensee currently has an order for 720 robots, while the largest U.S. order has been 120. "Just give me an order for 720," Engelberger challenged.

The Japanese are committed to productivity. While the Danbury Unimatics plant produces about 55 machines a month, Fujitsu in Japan is currently building a plant that will produce 100 robots a month.

The Japanese have also recognized that they have an aging work force and will need robots to maintain expected levels of production. Further, they have acknowledged that robots have affected the entire production process and they operate them three shifts.

"Nobody needs to buy a robot," Engelberger said. "The only thing that drives you to have a robot is that someone else has one."

All manufacturers without robots competed well, as was the case of American auto makers, until the Japanese import invasion. In fact, Engelberger called the current growth of robotics in American manufacturing, "innovation by invasion."

Unimatic's Efforts

Unimatic is currently working with General Motors Corp. to develop Puma robots (Programmable Universal Machine for Assembly) that use Unimatic's proprietary language VAL. What is interesting about the GM work, Engelberger noted, is that 90% of the parts in an automobile weigh less than five pounds, parts that can easily be lifted by a man-weight robot.

Robots are now being moved into assembly-line operations — even such as screwing light bulbs into dashboard panels — but up until now have been primarily used for spot welding — 1,800 of Unimatic's 3,500 stand-alone machine population. The others do dirty factory work such as die casting, permanent mold casting and potpourri applications. They are accurate shots at pouring hot aluminum, Engelberger noted.

Engelberger pointed to a list of basic improvements needed by American industry:

- Design for manufacturability rather than form and structure. Car odometers are manufactured by machine because they are the same in each car. Speedometers are manufactured by people because they are designed differently in each car.
- Group technologies so that milling and lathe departments are next to each other for quick flow of operations.
- Integrate robotics, computer-aided design (CAD), computer-aided manufacture (CAM) and other advanced technologies.
- Automate warehousing and prevent the accumulation of scrambled tubs of parts that are indecipherable to robots.

"The richness of all these things together will give us a chance to do in the factory what we have done on the farm," Engelberger observed.

James S. Albus of the Industrial System Division of the National Bureau of Standards (NBS) showed films of the robot arm with vision that the bureau is programming to pick up variously shaped objects on detection.

"Up until this time there has been little sensory perception," the robot enthusiast explained. "Until now programs have been played and replayed."

He foresees large gains in productivity as robots are integrated into large systems. This requires the availability of economical computers that are fast enough so the robot can react to the sensory data.

The programming problem is that the control programs grow exponentially with the increased number of sensors and become complex to write and impossible to debug, Albus said about the bureau experience.

To address this, the bureau uses hierarchical command and control structures. To run such programs NBS is in the process of implementing a network of microcomputers that are the simplest and least expensive way to build this system, Albus said.

All the speakers were highly enthusiastic about the use of robots, including William E. Jarett, who is heading a robotics effort at General Electric Co.: "There's only one limit to robots — the collective imagination of you and me as practitioners of a technology whose time has come."

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I/O Standards Anticompetitive, Court Told

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — How can the federal government promote competition for DP procurements if it excludes competitors?

That is the question three U.S. Appeals Court judges asked a federal attorney here Tuesday as he argued against four mainframe manufacturers challenging a set of federal information processing standards.

The I/O standards, in effect since June, have effectively removed the companies from bidding for large government system acquisitions, according to attorneys for Honeywell, Inc., Burroughs Corp., Control Data Corp. and Univac.

The companies brought suit in federal court here a year ago asking the standards be overturned. But the government successfully argued the standards were a federal administrative matter and could not be challenged in court by vendors who, the government said, were essentially trying to tell the government what kinds of computer equipment to buy [CW, Feb. 11].

The firms are now asking the U.S. Appeals Court to overturn the lower court ruling and find the companies do have legal standing to challenge the standards.

In the year-long court battle, the government has conceeded the four standards, based on IBM architecture, do indeed harm non-IBM-compatible manufacturers but maintained the interests of government economy and efficiency supercede the economic interests of the four firms.

Leaning on the lower court decision, U.S. Attorney Mark Mutterperl told the appeals court last week the standards were promulgated under the 1965 Brooks Act, which mandated economy and efficiency in federal DP.

Congress did not intend to make equipment providers "beneficiaries" of the law, Mutterperl argued. Because the Brooks Act does not address vendors, he said, the companies cannot legally protest they have been injured by regulatory actions taken pursuant to the law — in this case, adoption of the standards.

The three-judge panel, however, appeared skeptical of Mutterperl's reasoning. Judge Lloyd F. MacMahon suggested that removing several major vendors from competition for federal contracts was not in the best interest of competition — an argument essentially identical to that of the four companies.

Mutterperl maintained the companies have not been excluded from competition for federal contracts. By their decision to not comply with the standards, the firms have taken themselves out of competition, he said, claiming there are 70 vendors who do comply with the standards.

Eldon Crowell, attorney for the four firms, argued, however, that the time and expense needed to comply with the standards means non-IBM-compatible manufacturers, such as his clients, "will be removed from the federal market for a substantial period of time."

Those companies will therefore suffer injury from the standards and the government, contrary to the intent of the Brooks Act, will suffer from a lack of competition, according to Crowell, partner in the Washington law firm, Crowell & Moring.

Interest Zone

This government/vendor relationship creates a "zone of interest" legitimizing the firms' complaint and entitling them to a court hearing on the standards, Crowell argued.

If the appeals court rules in the companies' favor and decides they do have standing to challenge the standards, the case will be sent back to the U.S. District Court here to be heard on its merits.

Although the appeals court usually takes as much as six months to render decisions, the court in this case has promised to act as quickly as possible. Because the standards are already mandatory for federal procurements the four companies would like the case resolved soon.

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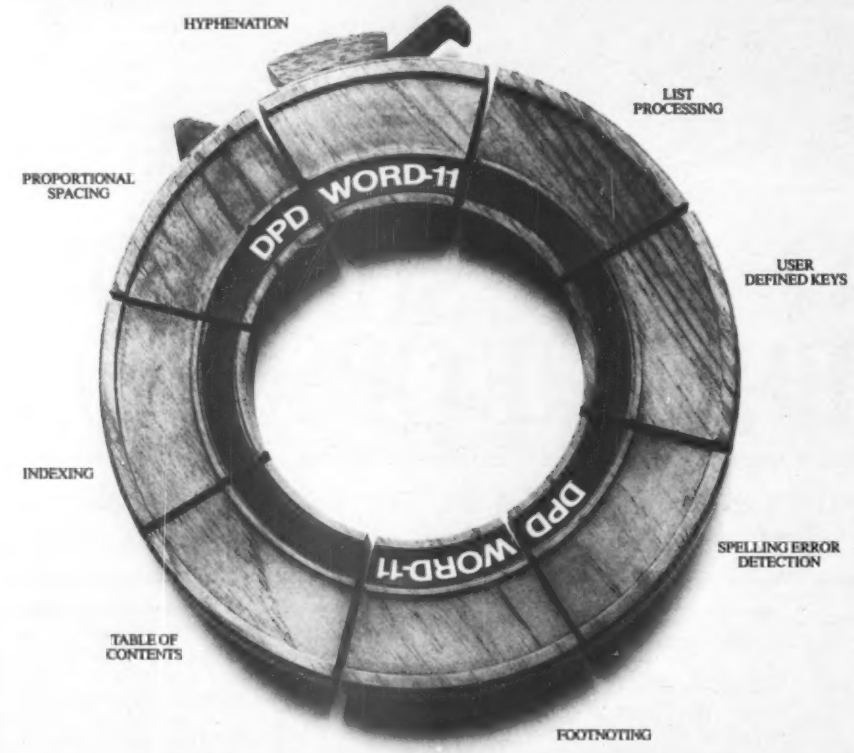

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Meet Gives Sneak Preview

DPMA Model Curriculum to Push Business

By Ron Jones
Special to CW

ST. LOUIS — The new model curriculum for two- and four-year college students being recommended by a committee of the Data Processing Management Association (DPMA) got a sneak preview here recently.

To no one's surprise, the Computer Information Systems (CIS) curriculum emphasizes the business side of computing and omits courses dear to the hearts of computer scientists.

The model, which was developed by DPMA members and others with a business bias rather than a committee of academic experts, was the topic of discussion at a regional conference and workshop here. The meeting was one of five such regional conferences planned prior to formally unveiling the model at the National Computer Conference (NCC) next May.

Course Curriculum

Seven core courses on the DPMA list deal with computer-based systems, applications program development, systems analysis and design and data bases. Twelve elective courses span a variety of topics, ranging from RPG and Assembler languages through EDP auditing and DP law to decision support systems and the office of the future.

The DPMA-CIS curriculum omits topics characteristic of the 1978 Association for Computing Machinery (ACM) computer science curriculum, such as numerical mathematics, automata, computability, formal languages, theory of programming, algorithms, organization of programming languages and artificial intelligence.

Furthermore, the DPMA-CIS curriculum is set in the context of business courses rather than the mathematics courses suggested by ACM for computer science. The difference is deliberate.

Colleges and universities are not teaching what industry needs in traditional computer science programs, according to Don Price, president of the Education Foundation of DPMA, which cosponsored the conference. He feels industry wants individuals with a broad business background.

When asked for the most unique aspect of the CIS curriculum, Dr. Tom Athey, who chaired the DPMA Model Curricula Committee, said it was its development by many people, including DPMA members, rather than a blue-ribbon committee of academics who have prepared past computer-science curricula. DPMA's Educational Foundation has assisted in the development effort and, together with the St. Louis DPMA chapter and the Center for the Study of Data Processing of Washington University, sponsored the October conference.

A questionnaire is being used to gain input from a variety of persons. One sent out in March drew responses from 97 representatives of industry and government compared with 78 responses from educators. Questionnaires are to be used at several points prior to release at the 1981 NCC. The five regional conference workshops provide opportunities for DP professionals to be heard. DP professionals wanting further information are invited to contact Dr. Thomas H. Athey, Chairman Information Systems Department, Cal Poly University, Pomona, Calif. 91768.

Despite efforts to involve DPMA members, attendance at the St. Louis conference was almost entirely from academia. Bill Tryon, DPMA member and workshop leader, apologized to the educators for lack of a DPMA turnout. The preponderance of educators was natural, however, since a stated goal of the conference was "the identification of a nucleus of faculty interested in business data processing education as contrasted with computer science education."

Textbook publishers were the second largest group in attendance. The impact of the CIS program will first effect colleges, universities and textbook publishers and later effect industry as better qualified business application programmers and analysts are produced during the '80s.

Successful development of the CIS program will result in three academic disciplines in computing: Computer engineering, computer science and

(Continued on Page 30)

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Curriculum Emphasizes Business Computing

(Continued from Page 29)

computer information systems. Graduates of computer engineering and computer science would be recruited by vendors for the production of hardware and vendor-supplied software such as compilers and operating systems.

User Orientation

Computer information systems graduates would be associated with end users rather than with hardware manufacturers and would produce user-oriented computer programs. In contrast to computer engineering and computer science — which have been most associated with engineering and mathematics — the computer information systems program is intended for an academic home in the business school.

Featured speaker Dr. John Hamblen, chairman of the Education Committee for the American Federation of Information Processing Societies, agreed that curriculum development is settling down in three clusters: Computer science, computer eingineering and information systems — the latter being associated with schools of business. Hamblen noted, however, that a curriculum committee for computer education for management was launched by ACM in 1965 and resulted in the publication by ACM in 1972 and 1973 of model curricula for graduate and undergraduate programs in information systems. Several academic programs for information systems exist today, although not as numerous as computer-science programs. Minnesota and UCLA provide noteworthy examples. Hamblen's major topic was the current shortage of DP manpower and his projections for the future.

Implementation Problems?

Dr. Athey and Dr. Gerald E. Wagner, another member of the executive committee developing the CIS curriculum, have written of the need to educate about the "real world" of the DP work place. However, DPMA's next task may be to face up to the real world of academia. Shortages of qualified faculty and accreditation problems stemming from excessive use of industry personnel as lecturers may block implementation of their educational program.

The major accrediting body of four-year and graduate schools of business is the American Assembly of Colleges and Schools of Business (AACSB). The AACSB rule is that 40% of undergraduate course-work must be taught by faculty who are full-time employees and possess doctoral degrees. The requirement is 75% at the graduate level. The AACSB rule is enforced as an average for an entire school, and thus a smaller percentage might be possible in the CIS area if offset by higher percentages in other areas.

This rule might pose a barrier to implementation of the CIS program for the 230 AACSB members. Professors with doctorates in CIS are extremely rare. The production of doctorates in the allied computer science area has declined in recent years because of the pressure of industry for employees.

DPMA Accreditation?

Members of the CIS Executive Committee raised the possibility that DPMA might provide accreditation for the CIS program. The American Chemical Society, itself an accrediting body in chemistry, has been contacted by them for information about the accrediting process.

Another indication of possible DPMA accreditation lies in discussions held with the Certificate in Data Processing (CDP)-granting Institute for the Certification of Computer Programmers (ICCP). Could completion of the CIS program waive all or some of the experience requirement for the CDP? If so, which academic programs would be accredited for the waiver? And by whom?

The creation of a new accrediting body is a very expensive and timestaking process, according to Dr. Jack D. Heysinger, recent member of the AACSB Board of Directors and former business school dean. He recommended that DPMA work through existing accrediting agencies.

Stronger Role

Accreditation and implementation problems for the major universities might strengthen the role of the two-year community colleges. For example, St. Louis Community College at Florissant Valley has a 36-hour, 12-course data processing program — an amount equal in quantity to that which might be encountered in a four-year program.

The geographically-central St. Louis location drew conference attendees from across the nation — from Texas to Minnesota and from Washington state to Massachusetts. Washington University's Center for the Study of Data Processing provided an examplary instance of university and industry cooperation.

More than 20 corporate associates joined with the Center in offering a variety of traininig, development and continuing education services to DP professionals. Center Director Robert J. Benson and Associate Director Bob Raush acted as hosts to the flawlessly conducted conference. DPMA may also wish to return to St. Louis in the future; the AACSB has its headquarters there.

Jones is a professor of computing at the University of Missouri-Kansas City's School of Administration.

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In One-Month Period

County Finds 50% Downtime for IBM System

By Bruce Hoard
CW Staff

POUGHKEEPSIE, N.Y. – A "combination of complex malfunctions of various IBM hardware and software components" kept Dutchess County DP users here off their system 50% of the time between June 6 and July 10.

"During this period, the computer system failed almost every day for over four weeks," according to a letter from James J. Falanga Jr., commissioner of the county's Department of Computer Information Systems, to Lucille P. Pattison, county executive.

The letter listed several examples of the problems incurred. Falanga now maintains the problems have been solved.

"I don't know what prompted the situation," he said. "It was a whole myriad of problems."

The blame for the situation must lie with both the county and IBM, the commissioner added. IBM didn't realize the seriousness of the crisis as it unfolded and, with the system's normal customer engineer on vacation, things unraveled quickly, Falanga noted.

IBM refused to comment on the situation, calling it "confidential" through a spokeswoman.

However, in a July 31 letter addressed to Falanga, company field manager Robert L. Brown admitted "a breakdown in communications during this time frame severely impacted the problem."

Trouble Begins

Things first went wrong on June 9 when a county 3274 disk drive went down. Following the installation of a new logic card, it was restarted. However, the machine went down the next day and each of the remaining three days of the week, according to Brown's letter.

With each failure, the substitute customer engineer (CE) relied on on-site diagnostic information, phone assistance and remote assistance from IBM's nearby plant for help.

During this period, the CE was aware that the system's 20 in-house users were unable to access the system but unaware the additional 55 outside users were also locked out. He was finally told on Friday the 13th.

On the same day, the remote support center decided that new microcode would alleviate the problem and made arrangments to have it sent out the following Monday.

Turn for Worse

Instead of getting better, things then took a turn for the worse when the CE and a specialist discovered an "intermittent CICS problem." Checks were made to determine if the two problems were related.

On Tuesday and Wednesday, "3420 equipment checks" were reported and repaired.

Hopes Dashed

The 3270 microcode arrived and was installed on Thursday the 19th. Hopes that the problem was ended were soon dashed, however, when "the external network was brought down by what was believed to be CICS failures for which a fix was being obtained."

The next day, an I/O controller check on the 370/148 mainframe occurred, followed by a 3274 stopping again. Down came the system.

After more problems on June 23, a 3274 dump was obtained and delivered to the plant engineers at Kingston. They recommended replacement of the logic card installed June 9 and that was accomplished June 26.

More Problems

There were more problems reported on July 1 and July 9 when "highly intermittent" I/O checks occurred on the 148. Similar problems were experienced on July 10 and July 14. These are the final references to the situation mentioned in the letter.

Brown went on to say the situation was unusual, complex and difficult to solve based on the paucity of available information.

He suggested more frequent visits to the location by field engineering management, review meetings between IBM and the county and the development of a system management plan for the center, a user of exclusively IBM equipment.

Although distressed by the incident, Falanga indicated no interest in switching vendors.

Since things have straightened out, IBM has worked on its internal communications and "made us more aware of what kind of communications channels are available to us," he said.

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SHADOW II's technical consultants know IBM hardware as well as IBM technical consultants. And because SHADOW II is such an advanced TP Monitor, it can typically be installed in less than one hour. Compare that to the time it takes to install CICS.

And while there seems to be a great deal of wisdom in reasoning that technical support and maintenance will be better for CICS by virtue of its being an IBM product, consider the reality of the matter.

SHADOW II has, in the first place, far lower technical support requirements than CICS. But when such support or maintenance is required, an ample and highly capable support team stands ready on a moment's notice to provide necessary service. In fact, present users and objective evaluators alike cite this area as one of SHADOW's greatest strengths. In addition, our technicians provide four days of intensive, on-site, classroom education in using the SHADOW package.

Finally, for those who reason that despite the problems which CICS has become notorious for, it is still a risk to buy a TP Monitor from a company other than IBM, we would like to summarize by saying this:

SHADOW II has long continued to outperform CICS on virtually every important criteria. And while IBM has made attempts at correcting problems, CICS performance stills falls dramatically short of SHADOW II in memory usage, CPU utilization, response time, application development time and programmer training time. In short, no matter how IBM has added to, taken away, or otherwise repackaged their system...it's still CICS. And therein lies the problem.

So if we haven't already given you reason enough to consider SHADOW II for your TP Monitor, we welcome the opportunity to give you more. And it just doesn't seem reasonable not to let us.

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System Development To Head Meets

CHICAGO — "Structured Analysis and Structured Design" is a five-day seminar conducted by Eduteach, Inc., to be held here Dec. 8-12.

Designed for exprienced programmers, designers, analysts and managers, the program reportedly spans state-of-the-art techniques for system development.

Emphasis is placed on new methods of improved system and programming technologies and tools that maximize productivity and minimize production and maintenance costs.

Advanced registration in this seminar is required and classes are limited to 14 participants. Cost of the program is $500, which includes all course materials.

Further details may be obtained from Dushun Mosley, Suite 907, Eduteach, Inc., 162 N. State, Chicago, Ill. 60601. Registration closes Nov. 17.

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On-Line Data Base Access Aids Reporters at Presidential Debate

CLEVELAND — Reporters covering the presidential debate here last week were aided by a special information system provided by the Cleveland Public Library.

The library supplied on-line access to its own newspaper data banks and those of several commercial time-sharing data banks, including the New York Times Information Bank, the Associated Press Political Data Base and the Dow Jones News Retrieval Service.

The library's Digital Equipment Corp. PDP-11/70 was at the heart of the system.

It was linked to the press room at the Cleveland Convention Center by four specially installed voice-grade telephone lines, according to Charles Waller, DP manager at the library.

In the press room, reporters were able to access needed information via a DEC VT100 CRT terminal, two DEC LA34 hard-copy printers and two Texas Instrument, Inc. Silent 700 printers linked to the library by a Multi-Tech Systems, Inc. FM30 accoustic coupler.

"I think we'll be able to handle the national press corps," Waller said, when asked if his system would hold up under information requests from the anticipated horde of 1,500 reporters.

Such a system is not unprecedented, he noted, adding a similar set-up was supplied to the press at last month's John Anderson-Ronald Reagan debate in Baltimore.

That system was put together by the Enoch Pratt Library and, in seven hours, provided reporters with answers to 85 diverse political questions, he said. Information supplied included candidates' quotes and positions on issues.

Security in Banking Set As Topic of Jan. 28 Meet

PARIS — "The Fifth International Security in Banking" is slated to take place here on Jan. 28-30, according to conference sponsors at the Institut de Recherche Interbancaire.

Thirty different nationalities are expected to represent 10 countries in presentations and debates dealing with security problems unique to information handling in banking. White-collar crime, risks due to the rise in automechanization, abuses in the various money-transfer systems and attempts to crack banking secrets will be discussed and solutions sought.

Further information on the upcoming event is available from Insig, 40, Rue de Monceau, 75008 Paris, France.

Framingham State Sets Department For Computer Ed

FRAMINGHAM, Mass. — D. Justin McCarthy, president of Framingham State College, formally announced the school's recent establishment of a separate Computer Science Department.

On hand to present a $2,000 grant to the new department was John Nevison, chairman of the Greater Boston Chapter of the Association for Computing Machinery (ACM).

Computing facilities at the college presently include the Mass. State College Network dual mainframe Control Data Corp. Cyber 170, a Digital Equipment Corp. PDP-11/34 and a microcomputer laboratory.

Also a part of the computer science major at Framingham State is an internship program that places qualified upper classmen in neighboring high-technology companies such as Data General Corp., DEC, Prime Computer, Inc. and Raytheon Co.

The computer bachelor of science major became a degree program in 1974, and the college is presently developing a master of science and a bachelor of science degree program to be offered through their evening division.

Further details are available from Framingham State College, Framingham, Mass. 01701.

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Disgruntled Former Students Sue Michigan Computer School

By Bruce Hoard
CW Staff

GRAND RAPIDS, Mich. — Two disgruntled former DP students are suing Key 5 Institute, Inc. here for $10,000 each on the grounds it offered an inadequate program and misrepresented career opportunities.

Valerie Stankus and Ronald Miklosovic, who graduated from the school last December, claim their list of complaints add up to a violation of the Michigan Consumers Protection Act.

They paid $2,400 each to participate in the five-month program, and neither has been able to find a computer programming job since graduation.

Amos Sterznick, a co-owner of the school, refused to comment beyond saying, "I assure you, this is the first complaint I've had in 12 years." No date has been set for the trial.

"We didn't finish a single book we started," said Stankus, who claimed her instructor was more interested in going through a lot of books rapidly than studying a few thoroughly.

She also claims to have received only 380 of a promised 650 hours of instruction.

Her instructor was not the one originally scheduled to teach, but a recent graduate who, "lacked sufficient ability, educational background and field experience to teach," she claimed.

The computer used by the school was "obsolete" and incapable of programming three of the four languages offered through the course, she claimed. The computer was a "Cascade Data" with an RPG compiler and frequently broke down, she added.

At one job interview, she was laughed at after describing the computer she had been trained on, Stankus said.

Sterznick was indifferent to her questions about inadequate training and either walked away or told her to "shut up" when she pursued him, she claimed.

Asked what assurances she had been given about employment opportunities after graduating from Key 5, the former student said, "They promised everything in the world. They told us we would have no problem getting a job."

The Michigan Department of Education recently gave the school a clean bill of health saying, "The curriculum was reviewed and found adequate to employ students at the beginning level of training."

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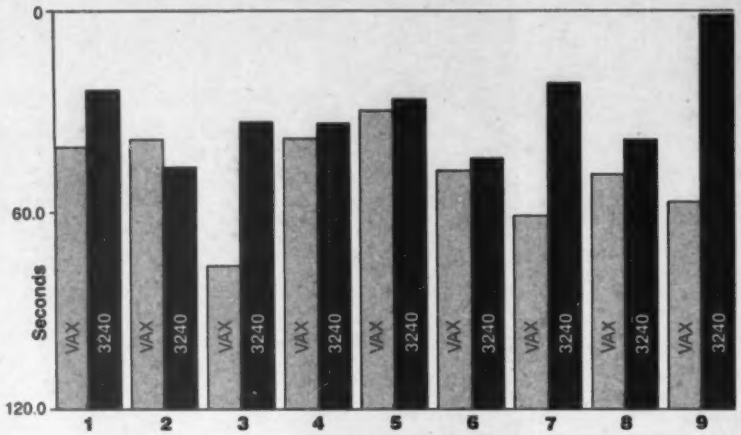
Benchmark Name	VAX 11/780 CPU time	Perkin-Elmer 3240 CPU time	Performance Ratio*
PMS0154	1.140	0.907	1.26
PMS0254	4.710	4.485	1.05
PMS0354	9.160	8.990	1.02
PMS0454	43.610	43.451	1.00
PMS0554	86.420	86.123	1.00
PMS0664	1.610	1.350	1.19
PMS0764	7.040	6.679	1.05
PMS0864	13.730	13.370	1.03
PMS0964	66.830	66.068	1.01
PMS1064	132.920	129.727	1.02
PMS1124	1.520	1.306	1.16
PMS1234	2.470	2.424	1.02
PMS1324	1.310	1.618	0.81
PMS1407	251.560	37.327	6.74
PMS1507	50.260	57.657	0.87
PMS1674	22.440	23.005	0.98
PMS1724	52.550	53.133	0.99
PMS1807	50.180	34.766	1.44
PMS1907	32.020	34.679	0.92
PMS2007	17.720	20.264	0.87
PMS2107	13.450	20.242	0.66
PMS2202	33.311	26.352	1.26
PMS2324	121.610	137.997	0.88
PMS2402	0.940	0.539	1.74
PMS2502	0.720	0.562	1.28
PMS2624	122.920	227.689	0.54
PMS2708	4.850	0.961	5.05
PMS2809	103.770	0.006	17295.00
PMS2934	0.660	0.414	1.59
PMS3009	0.230	0.006	38.33
PMS3103	0.610	0.398	1.53
PMS3202	4.740	3.923	1.21
PMS3307	2.470	1.959	1.26
PMS3407	39.190	7.774	5.04
PMS3507	5.580	2.587	2.16
PMS3607	156.540	20.077	7.80
PMS3701	4.480	1.621	2.76
PMS3802	4.060	2.874	1.41
PMS3903	6.050	3.864	1.57
PMS4002	9.330	5.505	1.69
PMS4102	76.290	77.764	0.98
PMS4202	118.490	125.039	0.95
PMS4301	110.650	75.569	1.46
PMS4403	1.990	0.739	2.69
PMS4584	219.990	189.081	1.16
PMS4603	18.640	16.939	1.10
PMS4701	0.350	0.077	4.55
PMS4802	0.830	0.880	0.94
PMS4934	0.340	0.050	6.80
PMS5008	0.430	0.168	2.56
PMS5108	98.950	55.419	1.79
PMS5208	0.900	0.917	0.98
PMS5308	0.330	0.029	11.38
PMS5408	2.080	1.697	1.23
PMS5502	1.130	2.180	0.52
PMS5602	207.140	198.685	1.04
PMS5703	585.170	254.545	2.30
PMS5824	18.740	18.194	1.03

*Performance Ratio = $\frac{\text{VAX 11/780 CPU time}}{\text{Perkin-Elmer 3240 CPU time}}$

2. Perkin-Elmer 3240 vs. VAX* Average Time by Job Classification



1. Integer
2. Single-precision
3. Double-precision
4. Math functions
5. Single-precision whetstone timings
6. Double-precision whetstone timings
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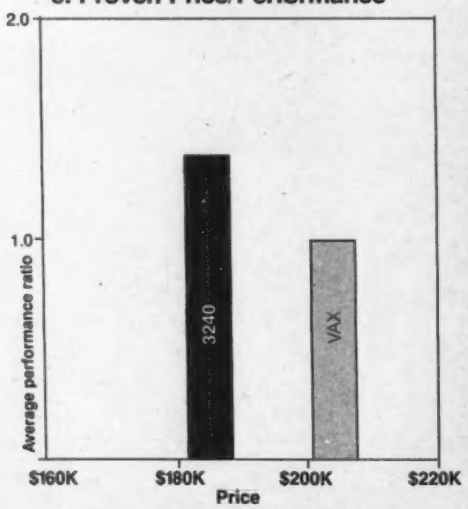

The configurations tested were 2 MB of memory, 67 MB disc, 75 ips tape, Floating Point Processor, CRT terminal, battery backup, and system software. The 3240 had a Writeable Control Store and Fortran Enhancement Package, while the VAX 11/780 had a Floating Point Accelerator.

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All 58 FORTRAN benchmarks listed in Table 1 were submitted by our customers and prospects reflecting their application needs. Applications that deal with the same kind of problems you face every day.

All benchmarks were run on-site at various locations across the country. And all were run by vendor-trained operators.

In Table 2, we organized the benchmark results into nine common types of job classification, so you can see at a glance how the 3240 stacks up vs. VAX 11/780. (The ninth classification demonstrates the superiority of Perkin-Elmer's system software, in this case globally optimizing FORTRAN VII.)

As shown in Table 3, the story is simple and uncomplicated. The Perkin-Elmer 3240 outperforms VAX 11/780. And it costs less.

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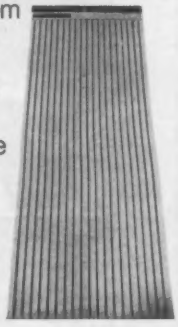

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Western Union, IRCs Dispute Gateway Ruling

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Federal Communications Commission (FCC) efforts to promote greater competition in international communications have produced a major battle between Western Union Telegraph Co. and the U.S. international record carriers (IRC).

The nub of the dispute involves commission decisions last December which, among other things, allowed the IRCs to interconnect with international telex users at 21 additional "points of operation" within the interior — "hinterland" — U.S. Previously, IRC networks were allowed to terminate domestically only at five "gateways" — New York, Washington, D.C., Miami, New Orleans and San Francisco.

In exchange for allowing the IRCs to serve the 21 additional cities directly, the FCC said the carriers would have to interconnect their domestic access facilities with each other and with the Western Union domestic telex and TWX network. Also, the IRCs would have to unbundle their tariffs — charge separately for transmission, access lines and terminals.

The basic aim in both cases was to reduce costs for the user. Interconnection would give the user access, through a single terminal, to points served by one IRC but not by others, thus eliminating the need to subscribe to more than one service and lease more than one terminal as previously required.

Unbundling would enable the user to exploit discounted rates introduced last year by all of the IRCs. These tariffs allowed a discount of 55 cent/min if the customer provides his own terminal and access circuit to the nearest IRC termination point.

Court Action

Western Union has taken the gateway expansion order to court, alleging — among other things — that allowing the IRCs to extend their operations into the U.S. hinterland without permitting the telegraph company to offer international services directly is unfair.

Last December, the commission recognized the need for this quid pro quo by allowing Western Union to offer international services. However, a federal court subsequently overruled the commission in response to a complaint from the IRCs.

The major battle at the moment concerns the third change wrought by the FCC last December requiring Western Union and the IRCs to interconnect their transmission facilities.

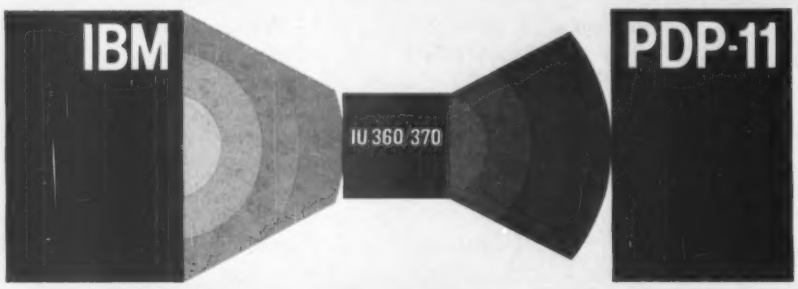
Traditionally, Western Union has interconnected only at the IRC switching centers, most of which are located in New York and San Francisco. If the telegraph company is forced to interconnect at all five of the traditional gateways — as well as the 21 additional points of operation established in December — it will carry most outbound and inbound international telex traffic a much shorter distance and earn far less revenue as a result. The company claims that "better than 50% of its telex business consists of traffic transmitted to and from foreign points.

Recently, under protest, Western Union complied with the FCC order to file a tariff permitting interconnection at the five original gateways. Stating that it does "not intend to commit economic suicide," the telegraph company proposed charging each IRC a nonrecurring fee of $3,058,700 for establishing each connection, plus $13,200 per month for service.

Meanwhile, two U.S. international carriers have filed multimillion-dollar damage claims against Western Union.

In 1976, RCA Global Communications, Inc. (RCA Globcom) received FCC permission to extend dedicated circuits to Miami and New Orleans from its New York switching center. But Western Union, "to maximize its revenues," has continued to "circuitously" route telex and TWX messages to New York, RCA Globcom charged, adding that it has been forced, as a result, to pay the telegraph company an extra $5.8 million in communications charges since 1976.

ITT has filed a $10 million treble-damage antitrust suit against Western Union, alleging that the telegraph company has refused to interconnect with ITT's domestic as well as international affiliates.



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Seminar Series Set for IP Pros

NEW YORK — The New York City Chapter of the Association for Computing Machinery (ACM) has launched a nonprofit seminar series for information processing (IP) professionals.

The NYC/ACM schedule encompasses "Data Base Design" on Nov. 3; "Robots Today," Nov. 6; "Attacking Application Development Inhibitors," Nov. 11; "Going into Business for Yourself," Nov. 19; "Creativity," Nov. 24; "Overview of Voice Response Technology," Dec. 1; "Innovations in Computer Architecture," Dec. 4; "Communications Choices for the 1980s," Dec. 8 and Dec. 15; "Microcomputers' Adaptability," Dec. 18," and "Computer Typography," Dec. 22.

Fees for the various programs vary. Details on the Professional Development Seminars are available from ACM at P.O. Box 245, New York, N.Y. 10163.

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H.G. Wells' time machine was a fantasy. IBM's is a fact.

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Firms Urged to Adopt OECD Privacy Policy

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The State and Commerce departments are urging U.S. businesses to publicly embrace personal data privacy guidelines recently adopted by the Organization for Economic Cooperation and Development (OECD).

The voluntary guidelines, which urge personal data be secured against unauthorized access or disclosure, also call on OECD member countries — Western European nations and their major trading partners, including the U.S., Japan and Canada — to foster unimpeded international data flows.

By publicly adopting the principles contained in the guidelines document, corporations can possibly avoid problems of data protectionism in international business transactions involving overseas information transfer, according to government officials.

Adopted by the OECD after two years of negotiations, the guidelines say countries should "endeavor to remove or avoid creating, in the name of privacy protection, unjustified obstacles to transborder flows of personal data."

However, U.S. officials pointed out at a recent State Department meeting here that the guidelines would also allow national governments to restrict data flows to countries that do "not substantially observe these guidelines." Exceptions could also be made for various categories of personal data if the information would not receive "equivalent protection" in the destination country.

Because U.S. privacy laws do not correspond to those of other OECD members, a private-sector show of compliance with the guidelines could forestall many data flow restrictions implemented under the exceptions provisions, according to Commerce officials.

The guidelines "should be fully acceptable" to U.S. firms, according to William Fishman of Commerce's National Telecommunications and Information Administration, a U.S. negotiator to the OECD privacy effort. But, he added, the document is only a "statement of principles" and not legally binding on the organization's membership.

It can assist U.S. businesses in maintaining open information flows, but companies should make it known nationally and internationally they embrace the guidelines principles, Fishman said.

It was suggested at the Oct. 23 meeting here that a number of OECD members, including the U.S., might move to harmonize privacy protection legislation with the guidelines, but, until then, private organizations can help themselves by publicly honoring the guidelines.

U.S. negotiators were pleased the final OECD document reflected the "free-flow" position long espoused by the U.S. and reported to the State Department advisory group on transborder data flow that follow-on OECD talks on economic issues of data flow seem to also be leaning toward a free trade posture.

Under-Secretary of State Matthew Nimitz said a U.S. "plug for free trade" was well received at last month's OECD meeting on information, computer and communications policies.

U.S. delegates to the Paris meeting agreed with Nimitz and told the advisory group that other nations' representatives at the meeting showed a willingness to study in depth various data flow issues and did not seem bent on rushing into data protectionist actions.

Fears of Hegemony

Fears of possible U.S. hegemony in international data processing and communications and of resulting threats to OECD members' economic and cultural sovereignty seem to have subsided with the successful completion of the privacy guidelines, according to Nimitz.

As the developed nations begin considering the economic aspects of data flow, the privacy issue is no longer central to the debate because of the guidelines, he explained.

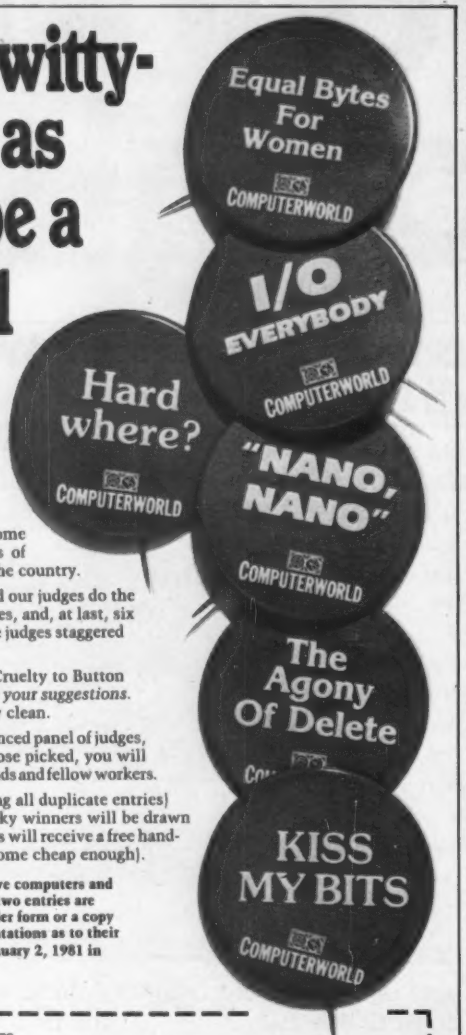
According to the State Department, the U.S. will continue to push its free trade policy in meetings of the OECD, European Economic Community and other forums as well as in bilateral talks with U.S. allies. Such talks include upcoming discussions with the Japanese, who are showing more interest in data flow issues now that they have taken on more economic and trade dimensions, department officials said.

While data flow discussions will continue as a lengthy and involved process, the State and Commerce representatives said they are optimistic because of the success of the guidelines effort and because U.S. trading partners are showing a genuine interest in the American free market approach to international communications.

Also, Nimitz pointed out that the Third World countries, to date some of the strongest advocates of data protectionism policies designed to usher in a "new world information order," have been singularly unsuccessful in defining what the "new order" should be.

He noted the inconclusive results of the recent Unesco meeting on international communications in Belgrade and said "there is never going to be, in my opinion, a new world information order" because of this failure to reach a consensus on its structure.

If you can write a witty-one-liner as good as these, you could be a winner in the 1981 Computerworld button contest.



As all you button freaks know, *Computerworld* buttons have become a tradition in the industry. And every year we distribute tens of thousands of them at NCC, Info, and other trade shows across the country.

Last year, for the first time, we let our readers do the writing, and our judges do the laughing. We spent many hours sifting through hundreds of entries, and, at last, six winners (shown above) emerged from the smoke-filled room. The judges staggered out later.

This year, despite protests from the SPCBJ (Society to Prevent Cruelty to Button Judges), we've decided to do it again. And we're hereby *soliciting your suggestions.* They should be *short*, funny, relevant — and at least moderately clean.

As many as six suggestions will be chozen by our (by now) experienced panel of judges, based on criteria known only to them. If your entry is among those picked, you will receive a certificate of appreciation suitable for impressing your friends and fellow workers.

In addition, all the people who submit winning entries (including all duplicate entries) will be thrown into a hat (at least their entries will) and six lucky winners will be drawn more or less at random (we never promised fair). These lucky souls will receive a free hand-held computer game valued at well under $100 (if we can find some cheap enough).

You may not enter as many times as you like because we know you have computers and can run off huge numbers of entries which will drive us crazy. So only two entries are permitted per person and all entries must be received on the official order form or a copy thereof. All decisions of the judges are considered final, and no representations as to their competence, skill or fairness are being made. Deadline for entries is January 2, 1981 in our offices in Framingham.

yes,

I'd like to enter Computerworld's ridiculous button contest. I hope your judges can read. Here is my entry (if you have more than one, please put them on separate forms). (All entries become property of CW Communications/Inc.)

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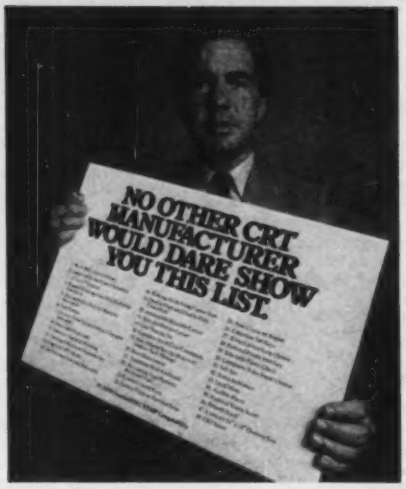

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Contracts Seen Placing DPers in Legal Jeopardy

By Connie Winkler
CW Staff

NEW YORK — Data processing managers might one day be found criminally liable for entering into computer contracts that involve stolen software — legally being a fence — or are totally nonprotective of their company. Dick H. Brandon, who heads Brandon Consulting Group, Inc. here, presented that possibility to show the sorry state of many users' contractual obligations.

One-page contracts from vendors often offer absolutely no protection for the customer, and companies could chose to take the DP manager to court, Brandon said at the New York chapter of the Association for Computing Machinery (ACM) recently.

Poor contracts and numerous other problems have led to a marked increase in computer litigation so that there are 500 cases before the courts today. By 1985 Brandon predicted there will be 5,000. For the 500 filed, there are probably 5,000 dissatisfied users who chose not to make their mistake public.

Brandon said his small consulting company alone is handling 46 such cases and he averages two calls per week from both users and vendors who have just been sued or are about to sue.

"I am startled by this," Brandon said. "We are spending inordinate amounts of money suing each other."

He presented a picture of the increasing failure of users to obtain adequate contracts and of vendors not delivering what was promised and then resorting to finger pointing.

Horror stories included a system with 71% availability, experiencing 1,200 incidents of failure over a two-year period, and data entry terminals with seven-minute response times.

Brandon said he discourages users from suing because of the tremendous expense involved — not just lawyers' fees, but travel and court expenses.

He cited the recent Triangle Underwriters, Inc. vs. Honeywell Inc. case where Triangle was awarded $1.1 million when the installation of a computer was followed by the company going out of business. After appeals are heard and the other cuts taken, Triangle may get $500,000 in 1982 — eight years after losing the business. And that's one of the best rewards in the history of the industry, Brandon added.

Stand-Off Point

How has the situation gotten to such a stand-off? Brandon listed these problems:

• Financial pressure. Vendors, mostly undercapitalized, are under tremendous financial pressure. One vendor said he would rather sell the customer the wrong machine than lose the sale.

• Proliferation of vendors. Of the 6,000 vendors in the industry today, 3,000 were not around five years ago.

• Vendor financial viability. Only seven of those 6,000 vendors have sales over $1 billion, only 20 with over $250 million, only 200 with sales over $50 million and on down until the 4,400 vendors with sales under $1 million.

• Perception problems. The difference between what the vendor says he will deliver and what the customer thinks he is going to get has been heightened by the increase in computing power and the decreased cost, which has been heavily advertised.

• Reliability. Lemon systems exist, but clients continue to place their entire business on the system without any backup. A dead-on-arrival (DOA) machine doesn't work when it arrives at the customer, and although DOAs are decreasing, they still exist. Brandon said Data General Corp. has cut its DOA rate from 15% five years ago to 5% today.

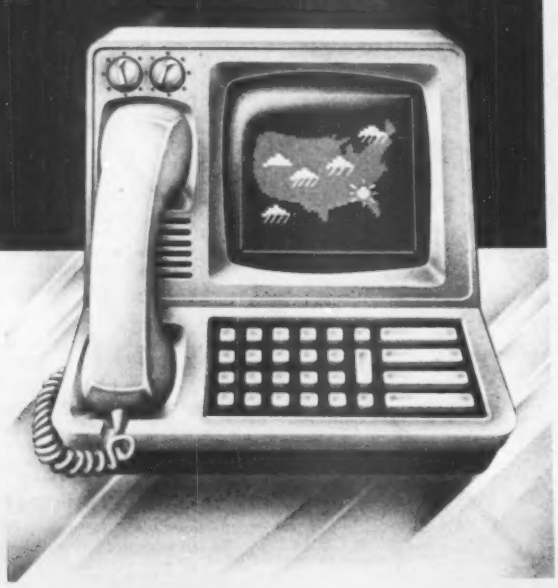
• Performance problems. One vendor simply failed to properly size a data base and the memory delivered was too small, Brandon said.

• Industry traditions, particularly IBM's one-page contract. IBM allowed only that the customer could have the machine removed on 30 days' notice.

To deal with all this Brandon recommended more sophisticated contracts and an arbitration clause, whereby instead of going to court, a DP-knowledgeable arbitrator from the American Arbitration Association would decide the debate.

These contracts have to clearly define responsibilities, spell out ownership in the case of software, set performance and provide for business termination. Brandon's firm provides a free contract checklist; the address is 1775 Broadway, New York, N.Y. 10019.

FRANCE INTRODUCES A NEW TELEPHONE SYSTEM THAT ISN'T ALL TALK.



As one of the first countries to recognize the future significance of an information based society, France invested some 30 billion dollars in the modernization of its telephone system and the development of a range of products based on the convergence of telecommunications and computers. This is known today as the 'Telematique Programme'.

Using the advanced technology of TDM and packet switching (Transpac), the French telephone line is being transformed into a multifunctional tool, permitting information to be transmitted in all forms: Oral, visual, and by means of the 'Telewriter', even handwritten or drawn.

Once equipped with a video screen, the telephone user will have access to Teletel (the French videotex service), offering services such as armchair shopping, reservations and electronic mail, as well as a wide range of information including entertainment, travel and even electronic directories, which will be given a 250,000 terminal trial in France during 1981. (This system is technically compatible with Antiope broadcast teletext service.)

Recently, the USA's largest computer information service for the home signed a distribution agreement for a quarter of a million of these low cost Teletel terminals over the next three years.

Another Telematique product, the digital fax terminal, will produce hard copies of the information provided by Teletel and will also serve as a low cost copier.

A further major development is the 'smart card', employing a microcomputer. The added security and intelligence this provides will be invaluable for both point of sale and Teletel home based transactions.

For the first time in the USA, the full range of these products will be demonstrated live in the 'French Pavilion' at the Intelcom '80 exhibition, opening on November 10th.

Come and take a look. You'll see that the French 'Telematique Programme' isn't all talk. It's a reality.

For further information, write to Intelmatique, C/O France Telecom, 1270 Ave. of the Americas, N.Y., 10020.

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CDC Courses On CAD/CAM

ROCKVILLE, Md. — Courses in computer-aided design and computer-aided manufacturing (CAD/CAM) are now being offered by Control Data Corp. on both a public and a private in-house basis.

The curriculum includes a "Management Overview of CAD/CAM," "Introduction to CAD/CAM Fundamentals," "Computer-Aided Design and Analysis" and "Control of Machine Tools."

Lengths and prices of these programs vary. Additional information can be obtained from Control Data Corp.'s Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

With Fewer Lost Sales

Truck Dealership Teams Up Horsepower, CPU

LOS ANGELES — Computing power has joined horsepower to help a heavy duty truck dealership keep its profits up and costs down.

Steve Jacobs, parts manager at the J.T. Jenkins Co. branch in Los Angeles, shows off the team — a terminal and the heavy duty tractor it supports via an automated parts inventory system.

The J.T. Jenkins Co., which grossed $52 million in sales last year, exclusively services Kenworth trucks in southern California and is a major dealer for diesel-powered construction equipment. The firm has major sales and services branches here and elsewhere in California in Bakersfield, Irwindale and San Diego.

"We experienced such a rapid growth in diesel parts sales (50% in three years) that we developed an on-line computer system to keep pace," Robert Emett, DP manager, said.

"We now have an efficient system for managing inventories, determining stock status and prices and handling all the math and paperwork vital to parts of sales and invoicing," he said.

Before installing an IBM 370/115 computer and CRT terminals, Jenkins had grown so rapidly that its manual system was unable to keep pace. For example, at each of the sales and service branches, parts specialists frequently had to trudge between the counter and warehouse just to see if a part actually was in stock, Emett recalled.

If not, the specialists had to check other branches to fill the order. Sales were occasionally lost to a competitor because the customer could not spare the time to complete the transaction.

If the part was available, an employee had to pore through a thick price book that referenced some 43,000 line items in Jenkins' parts inventory. Pricing out the items invited errors, either in arithmetic or illegible handwriting, he noted.

Sometimes, errors resulting from this process involved significant amounts of cash that Jenkins would later try to recover via an amended statement to the customers concerned.

As the business volume increased, the errors increased; Jenkins was forced to expand its staff just to monitor the error-prone system.

"That's when management decided to go to an on-line network," recalled Steven H. Jacobs, parts manager at the Jenkins branch here. "The computer was installed at the nearby Jenkins headquarters, along with IBM 3270 CRT terminals and printers.

"In selling parts today, a specialist no longer wears out shoe leather trekking from the counter to the warehouse to check the parts bin," Jacobs said. "All data is stored in the computer where any branch can get to it."

At the display terminal, a parts specialist keys in an account number to bring up an appropriate invoice on the CRT screen.

Then as data on a part is entered, the computer instantly checks the availability of the part, where it is located and how much it costs.

The computer checks creditworthiness of a charge customer, generates paperwork for billing and delivering the part and automatically updates the parts inventory file.

A TIMEPLEX CUSTOMER REPORT ON STATISTICAL MULTIPLEXING.

Eight California-based companies of the Alco Standard Corporation use the Timeplex SERIES II MICROPLEXER™* to concentrate the input/output of up to 30 terminals linked to a computer in Valley Forge, Pa.

This network is managed by Alco Data Services, which offers computer services to the 130 companies that comprise Alco Standard Corporation.

"Effective network management and control are indispensable," according to Norm Pfisenmayer, Corporate Director, Alco Data Services, "since our West Coast companies use the system for a variety of crucial on-line applications, including inventory control, accounts receivable, accounts payable and general ledger, to name a few."

The SERIES II is equipped with a unique Supervisory Port option–a window into the network–which provides key operating statistics and diagnostic information to the user, without interfering with the function of the system.

States George Kovolenko, Senior Communications Consultant, Alco Data Services: "One person, sitting at a CRT here in Valley Forge, easily monitors the system. At the same time, the operator can automatically downline program any multiplexer channel in the system, even those in California–all from the front panel of the master unit."

Concludes Mr. Kovolenko: "As far as multiplexers are concerned, we needed advanced features, flexibility and reliability. And we found it with the Timeplex MICROPLEXER."

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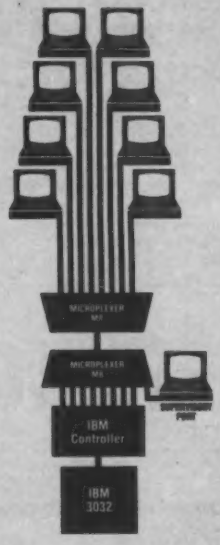
"At Alco, we rely on the unique Timeplex multiplexer to monitor a network linking eight California companies. All from a single CRT 3,000 miles away."

George Kovolenko
Senior Communications Consultant
Alco Data Services



This West Coast data communications network, which is managed by Alco Data Services, is based on SERIES II MICROPLEXER statistical multiplexers located in Los Angeles, California and at the Corporate Data Center in Valley Forge, Pennsylvania.

*Patents pending

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A Bird? A Plane? A Mini?

HP Minis Flight-Test, Certify Rockwell Jets

BETHANY, Okla. — Rockwell International Corp. is using minicomputers to test and certify its high-powered propjet executive airplanes, including its Jetprop Commander 980. The testing for that plane required 140 flights, 253 hours in the air and 284 million different in-flight readings regarding equipment and flight performance.

To accomplish those tests Rockwell's General Aviation Division (GAD) here developed a minicomputer flight testing program, using both on-board and ground-based minicomputers to cut data acquisition and reduction times.

"The savings in time, money and man-hours have been incredible since we installed our first computers in 1976," said Bob Kerr, special projects engineer for Rockwell's General Aviation Division. "We estimated that the first three computers — Hewlett-Packard Co. HP 2100s — cost in total about $200,000, but they eliminated post-flight data assembly, a test procedure that cost approximately $366,000 for a single aircraft.

"The computers have since paid for themselves during aircraft development and certification," Kerr reported. "Now, with our newer HP 1000, GAD has cut man-hours by as much as 30% in the areas of software development and data reduction."

Speed and Flexibility

Before acquiring the computers, Rockwell used a photographic/oscillographic recording method that required several days for the data to be reviewed and analyzed. In 1974, Rockwell began considering other methods of testing and precertifying its business aircraft — small, twin-engine propjet planes that seat eight people. Minicomputers seemed to offer the speed and flexibility that were required, a spokesman noted.

Three HP 2100s were installed, the first one mounted behind the copilot's space. A CRT terminal was installed on top of the processor, while a magnetic tape unit was housed in the left side of the aircraft. Various types of front-end equipment — torque meters, air speed transducers, thermocouples and strain gauges — are located in strategic places on the plane to feed information into the processor. This configuration allows engineers to monitor 128 different parameters at up to 8,000 samples per second, Rockwell said.

The second system detects and analyzes vibration and sound levels, while the third is a data acquisition system for static ground testing. Rockwell had to move this last system and its associated Fourier analyzer to Norman, Okla., to aid in static ground testing there. But in doing that it created the need for yet another computer system, a spokesman noted.

HP 1000

The latest addition to Rockwell's computer testing equipment is an HP 1000, which replaces the system now in Norman, used to support flight testing.

The process is simple. The on-board computer collects information fed to it by the front-end equipment. The data is converted into engineering units, the output being simultaneously recorded on magnetic tape and displayed on the on-board CRT terminal for the flight engineer's use. When the plane lands, the magnetic tape is loaded into the HP 1000, where the data is analyzed, according to Rockwell.

On the ground, structural testing is conducted to simulate the performance of the aircraft in rough air and to determine load limits of the various parts of the plane, a spokesman added.

According to Kerr, Rockwell's program development capabilities have improved greatly with the HP 1000. "The iteration process, normally associated with source program development, is faster because we've replaced the photo reader/-punch units with a real-time disk operating system. With the new graphics terminal, we simply load instrument calibrations with the cartridge tape reader, which takes about half the time of the old procedure."

The graphics terminal also lets Rockwell engineers plot data on the terminal itself, bypassing the time-consuming process of producing hard copy on the digital plotter, the firm said.

Kerr is also pleased with the data storage ability. "People who work in any sort of testing have all been faced with the problem of storing and preserving large amounts of test data. With the new system, we have stored 225 flights' worth of information on 15 magnetic tapes."

The possibility of human error is also reduced with the HP 1000, Kerr said.

In the near future, Kerr said Rockwell will install a graphics terminal and real-time executive memory (Rtem) software in the on-board configuration, which currently consists of the computer, CRT terminal and magnetic tape unit. Performance data will be plotted in flight on the graphics terminal to determine the acceptability of data that is affected by the environmental conditions.

On the ground, the HP 1000 will probably move the RTE IV software, which will allow Rockwell's engineers a wider range of user programs and eliminate segmenting.

The current HP 1000 consists of 128K bytes of memory, and includes an HP 2607 line printer, HP 2644 CRT terminal, HP 7970 magnetic tape unit, HP 7905 disk drive with 14.7M bytes of memoy, HP 7210 digital plotter and an HP 2648A graphics terminal.

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Output Feeds North Carolinians

REIDSVILLE, N.C. — Output from the Rockingham County Department of Social Services' processor feeds residents in this North Carolina county.

Rockingham is one of the few counties in North Carolina to have a computer dedicated to the administration of its $2.85 million food stamp program, said Glenn D. Fuqua, director of the social services department. Most other food stamp programs are part of the county DP operation.

Prior to installing the Burroughs Corp. B800 system, the county used a Burroughs B80 computer. "We wanted to go on-line with remote terminals and keep our data on-line so that we could have full inquiry capabilities at our three locations. The B800 with its front-end processor, is ideal for data communications," said Ronald N. Winn, analyst/programmer.

The department has two satellite offices in the county, one in Eden, and another one in Mayodan, with a Burroughs TD 830 input and display terminal at each site. Two TD 830s are at the department's headquarters in Reidsville.

How It Works

A prospective food stamp recipient is interviewed by a department employee at any of the three locations and, based upon income and family size, may be eligible to receive food stamps. If the person is eligible for the program, the certifying employee sends an input document to the department headquarters for entry into the data base.

The eligible recipient, who receives $10 to $846 per month in food stamps, depending on income and family size, is then mailed an "Authorization To Participate" (ATP) form, which is like a check. The recipient takes the ATP to a U.S. Post Office where the U.S. Department of Agriculture food stamps are given in the amount specified on the form.

Depending on the season, 2,700 to 3,200 ATP forms per month are mailed to food stamp recipients, one form to a family, covering periods ranging from one month to one year.

"Dealing with this volume of food stamps and recipients is no easy accounting task," Winn said. "Add to that all the federal and state welfare reporting forms that are required, it is easy to devote half of the computer's time to these tasks."

Microfilm System Clears Vicks' Congested Paperwork

FORT WASHINGTON, Pa. — Lack of control of large amounts of paperwork and little space in which to store the documents were nothing to sneeze at for the Vicks divisions of Richardson-Merrel, Inc.

The ability to answer customers' questions promptly and accurately often means the difference between made and lost sales in the fast-moving, highly competitive health care and toiletry products industry, according to Walter J. Pietrak Jr., manager of systems engineering for the company, which manufactures such products as Vicks NyQuil, Vicks Formula 44, Clearasil and Oil of Olay.

The solution Pietrak chose was to put the order files on microfilm coded for automated retrieval using Eastman Kodak Co. Oracle equipment.

"Ours is a very customer service-oriented business," Pietrak said. "If we don't have products where they're supposed to be and when they're needed, we could lose that sale. After the products are delivered, we still need to respond promptly to customer inquiries."

Customer Service

The response is the domain of the Customer Service Department, which answers some 7,000 inquiries a month, about 5,000 of which require information from the order files. These files consist of the original customer orders, invoices and bills of lading for 196,000 orders received annually.

"Each year we accumulate over a million documents in our order files," Pietrack said, "and that was the source of a lot of our problems."

The primary problem was control of the documents. Eight different departments referred to the files and anybody could remove documents and take them back to their desks. Often those documents stayed out of file or in in-boxes for long periods of time, with the result that about 10% to 20% were considered lost at any particular time. Customer service correspondents spent many frustrating hours searching for documents that were not in the file.

Space was another part of the problem. The document paper files filled 49 filing cabinets that were crowding people out of the office space.

Oracle System

The Kodak Oracle equipment selected by Pietrak reduced the physical size of the file. Each 4-in. by 4-in. by 1-in. microfilm magazine contains the images of up to 6,000 paper documents. In addition, because every document image is refiled immediately after reference on the microimage terminal, out-of-file conditions are no longer a problem.

Three people are assigned to retrieving information from the microfilm file and they almost always have information back to the customer service correspondents within three or four working hours of the time they receive the request, Pietrak said. In certain situations where a customer is waiting for an immediate answer over the telephone, the microfilm operator will retrieve the information while the correspondent waits.

The microfilm operator also has the capability of making a paper copy of the document image by pressing a button on the Oracle microimage terminal.

The microfilm file has saved the space occupied by the 49 file cabinets in the Customer Service Department and another 50 in the archives in the basement of the building. On top of this, it has saved countless wasted hours of searching for proper documents for the customer service correspondents. Pietrak estimated that the total saving of time and space is almost $80,000 a year, and customers are getting their answers faster than with the paper files.

The use of microfilm coded for automated retrieval is saving about $80,000 a year in the Vicks Customer Service Department of Richardson-Merrell, Inc.

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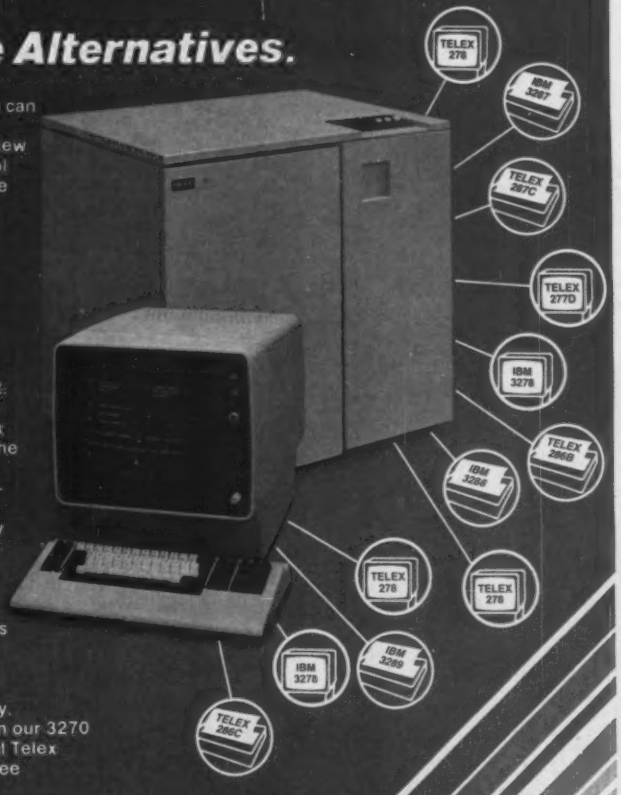

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A DBMS on a System/34?

Plastic Maker Fits Maxi Data Base on Mini

By Bernard Werner
Special to CW

KINGSVILLE, Ohio — The Total data base management system (DBMS) on an IBM System/34? Not even IBM had a DBMS to offer our one-man DP shop at a plastics manufacturer, Premix, Inc. In fact, in the spring of 1979, no software vendor could fill that need in programming a billing/receivables/sales analysis system save one — Cincom Systems, Inc.

Since the original plan involved a rewrite of a currently operating order entry system, speed in retrieval for customer service and ease in programming and maintainability were major considerations.

The complexity of the proposed system demanded some means to force the consistent use of data names, provide a centralized definition of all files in the system, and make all files accessible through a common set of routines. Four approaches were considered:

• Standard indexed files were used initially to plan the system and define the data fields in the system. This traditional approach would have led to a plethora of temporary work files and wasted space in files due to their rectangular structure. It also would have resulted in awkward programming to deal with invoices containing a variable number of line items and with shop work orders with a disparate number of due dates. In fact, the current order entry system used IBM's System/3 Bomp as a primitive data base to get around this problem.

• A "hme-grown" DBMS was briefly considered. It was discarded when time estimates put writing the DBMS beyond the constraints of the entire system. There was also little incentive to write any major software in assembler, even for the sake of performance, because of the possibility of changing processors in the next few years.

• IBM's "multiple index support for disk files" was also briefly considered. The technique is to use a suite of RPG and Assembler programs and up to 10 index/address files for a single master file. To retrieve an added record, the user would have to wait until all index/addresses were updated by the sort utility and an RPG program — up to 40 job steps for a single master file. It was considered unusable for the intent of the system — that of being on-line and interactive.

• Cincom's Total was the final consideration. It met our needs in providing consistent data names, centralized file definitions and a common set of routines for accessing the data in all files. Also of concern was the reliability of the software since the System/34 was still a new machine. But since System/3 Total had been available for a number of years, any fears were alleviated. However, the user interface had been rewritten because of machine architecture differences and did cause problems in the multitask version, problems since resolved.

Because Total is a network-oriented DBMS, any hierarchy of data records is not implied. Through its Data Management Language (DML), Total defines a relationship between a master file and a variable entry file. A master file may, in actuality, have no or multiple variable files related to it. However, a hierarchy may be *logically* imposed in the data base module which defines the contents and relationships of the files.

This master-variable file relationship is used to partially invert the data. The degree of inversion away from the traditional upright card-image file is at the user's discretion.

Because of these different means of access — up to 40 files — a System/34 limit can be accessed by any RPG, Cobol or Fortran program. Cobol and Fortran use Total through subprogram CALLs. RPG, the language of the billing/receivables/sales analysis system, uses a special device handler for a dummy file, DBIO. A subsequent personnel system was written entirely in Cobol when IBM supported it fully with Release 5 of SSP.

On-Line Use

It should be noted that Total is oriented towards random processing and superb for on-line use or where data is selectively accessed. The package's partial file inversion makes possible high-speed access.

The use of a sort utility often produced an intolerably long response times even though upright data with a sort is very flexible. While a DBMS requires more planning to identify relationships, it gives response several magnitudes faster.

However, reports involving whole files may take longer than a sort of a sequential file and a printing program. This is because the DBMS must be accessed in one RPG program, creating a sequential file, sorting it and finally formatting it into a report. In Cobol, this can all be done in one job step with increased efficiency, almost obviating this drawback.

Although different languages were used, techniques common to both greatly reduced coding time. "Dummy programs" were defined containing, in RPG, the header; DBIO file "F" specification; compile-time element lists in "E" specifications; "I" specifications with data structures to redefine the DBIO record 18 times — one for each file; basic access and error handling subroutines in the "C" specifications; and "O" specifications for exception output to the dummy DBIO file and the error handler output.

The use of the data structures in RPG and redefinitions in Cobol of the data area promoted the use of the "dummy program" as reusable code. Writing a program became a process of removing unneeded "I" and "E" specifications and fleshing out the "C" specifications. The process was done in Cobol by removing redefinitions. However, in Cobol, a user subprogram accessed Total and handled errors.

Often a 500-line RPG program had 300 lines predefined from the dummy program. Since accessing the data base in the remaining 200 lines was easy, a program could often be debugged in less than a day.

Total was installed in the middle of June 1979. By September, billing and aging was in production. A month later, standard costs were being captured from the System/3 Bomp, and historical diskettes were produced for comparative sales analyses by product, customer and salesman.

In this time, one person produced the entire system consisting of over 20,000 lines of programs, procedures and screen definitions.

Werner is data processing manager at Premix, Inc., N. Kingsville, Ohio.

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This Week: Who Writes Documentation? Where's

Q My company has recently formed a Standards and Documentation Group. I am the manager of this small group, which has two others besides myself. The duties of the group are still not well defined, but a more immediate problem has surfaced.

The group was formed because documentation was so lax. Since the very first day, programmers have been giving us source code listings without accompanying documentation, and asking us to complete the documentation. This has become an impossible task and a point of contention, in that I believe such documentation is the programmer's responsibility. Am I correct?

A Your most immediate task should be to work with DP management to define the duties and responsibilities of your newly formed group. The following list of possible duties and responsibilities may be helpful in your initial analysis:

- Develop and maintain the system development methodology.
- Control a library of existing applications documentation.
- Insure compliance with the methodology.
- Perform quality assurance for documentation.
- Serve as procedures and standards advisers to users and DP personnel.
- Conduct training in use of methodology and documentation preparation.
- Develop and maintain programming standards.
- Develop and maintain design standards and approaches.
- Maintain historical statistics on dollar, manpower and time utilization.
- Generate management reports.
- Gather feedback on methodology and update as appropriate.

Note that the actual documentation process was not included in the above list. The programmer is responsible for compilation of the complete program documentation package according to the instructions set forth in the design methodology. Documentation is not something you do after system implementation. Documentation, if done correctly, is an aid to program development and is therefore part of the program development process. The same is true of system documentation.

Asking anyone, other than the program author, to document a program from the source listing is an unnecessary waste of manpower.

Q I have been promoted and am faced with the task of evaluating subordinates. Would you recommend guidelines for employee performance evaluation, since my company has none?

A Performance evaluation is a system that encompasses a range of activities from manager-subordinate contracts and periodic performance reviews to termination of an employee.

The first step is to produce a written contract that is agreeable to both the manager and the subordinate — possibly using the MBO (management by objectives) technique. Upon completion, the subordinate should confirm an understanding of the contract and the criteria upon which performance will be evaluated and promotion will be based.

Subsequent performance evaluations become a farce if the subordinate is not held accountable for his actions. Depending on the employee's level within the organization, accountability might be based on a project plan, MBO objectives, management information system long-range plan, deadlines, milestones and so on.

Frequency of the periodic performance reviews would range from three months for new hires, to no longer than one year. For whatever reason, many DP managers simply go through the motions of performance evaluation. The resultant evaluations do not delineate the top performer from the mediocre performer. This is a disservice to the employee and the company.

Rate personnel in a minimum of categories and provide a support statement with each rating. Possible categories that should be weighted are: technical capabilities, quality of work, verbal communication skills, written communication skills, ability to interact with others, level of contribution to goals and appropriate personal qualities — initiative, imagination, flexibility and integrity.

A written report of the evaluation is critical. A manager has an obligation to let employees know where they stand. Documentation is equally important for both promotion and termination.

Q I know very little about computers and programming, but I read and enjoy *Computerworld* every week. My husband is a programming manager and he has *Computerworld* sent home rather than to his office. My husband and I seldom talk about his work, and when we do, I don't understand.

Here's the problem. It is not at all uncommon for Ralph (a fictitious name) to work two or three nights a week and often on weekends. He will work all night long at least once a month. Needless to say, his offbeat working hours not only disrupt our social, eating and sleeping schedules, but cause a dutiful wife to wonder.

Ralph has a standard comment to any

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Her Programmer Spouse at Night?

inquiry I might make: "It comes with the territory." Does it?

A Yes. in the programming environment weird hours are common. There are essentially three valid reasons why a programmer would be required to work other than regular hours.

First, the company computer system is usually saturated with production work during the day; therefore, off-hours are used to test certain programs and systems.

Second, when something goes wrong in the machine room, the applications and/or systems programmer responsible is called, day or night.

Third, the "crisis" is unfortunately very popular in the DP environment and to meet deadlines — which are sometimes unrealistic — the programmer must work long and often frustrating nights and weekends.

Q I am 57 and puzzled. Two years ago I took early retirement after 24 years in computers and started working on a desk-top computer in my bedroom. I enjoy the work and have produced two complete application packages. From time to time, to test the water, I write to advertising companies for jobs. I invariably tell them I am 57.

No one ever bothers even to ask me for an interview, even though I occasionally offer my services on any basis whatsoever — not needing any company benefits any more. The wording of the replies I receive, if I receive them, manifests a clumsy and pathetic attempt to appear not to discriminate on the basis of age. However, we all know, in this country, age is considered a curse.

By contrast, two foreign employers, in different continents, have shown interest in me, even though I have not mastered the languages of their respective countries. As it happens, I do not need the jobs, but merely want to know whether I am still lovable.

I have concluded that the U.S. is too hung up in its concern with cosmetics or social security taxes or what not to qualify as a smart buyer of experienced technical labor. One more mark for the Japanese.

A Not many people can boast 24 years of DP experience. Under the right circumstances, managers of short-handed information services departments would actively solicit your services. Unfortunately, the paradox of government intervention surfaces its ugly head — again.

Upon receipt of your resume, the information systems managers' rationale for their response might go something like this: "This man's resume is very impressive and he would certainly be an asset to our organization. His financial security is already taken care of and he is willing to take a lesser position for the sheer love of the information processing business. He is even willing to take a drastic cut in salary, status and work for no benefits.

"Employing him would be a mutually beneficial arrangement, but can we risk the possibility of age discrimination accusations? The next thing you know the Federal government would be all over us. I suppose we have no option but to send him letter X2-1" (a letter similar to those you have received).

I don't see the situation reversing in the near future. Although I am reluctant to say it, your best bet would be to approach potential employers as a private contractor desiring short-term work. I would like to invite employers to take advantage of this opportunity.

Q I am taking a special early retirement from a company for which I worked with Cobol and PL/I using both Univac and IBM equipment.

I would like to take on occasional jobs on a contract basis after my retirement. How would I go about making such contacts?

A First you need to identify the potential market. Small companies often contract with individuals for both software development and implementation of packaged software. Medium and large companies contract for part-time and temporary help for augmentation and work load leveling.

Prepare a resume that emphasizes your most salable assets — flexibility, experience, desire for temporary work only, etc. Send a few exploratory letters with brief background description to DP managers of a few local corporations — large and small. Indicate that a resume is available upon request.

Join and attend meetings of local DP professional associations. I have seen handshakes on several short-term, one-person contracts before dessert was served.

QA Turnaround Time By Larry E. Long

Have a question? Send it to Larry Long, Editorial Department, Computerworld, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

Long is a professor at Lehigh University, a DP consultant and author.

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EDITORIAL

Facing Facts

People who still argue that computer automation is creating more jobs than it is eliminating should face facts: Although computers create new positions for the people needed to program and manage them, the positions created can rarely be filled by the people whose positions they eliminated.

According to statistics collected during the past 10 years by a number of political scientists — some in the U.S. but most of them abroad — computer automation is creating a class of displaced workers too old to learn a new trade yet too young to retire.

Until their organizations automated, most of these individuals had been employed in what had been considered perfectly respectable, highly paid crafts, such as typesetting.

The problem is compounded by our youth-oriented culture. How recently did you hire a 50-year old applicant as an entry-level programmer? Have you ever hired such a person? Then what makes you think any other manager is likely to hire a 50-year-old ex-typsetter for any type of work at all?

The solution, however, is not to use fewer computers but to find meaningful work for those whose skills become outdated.

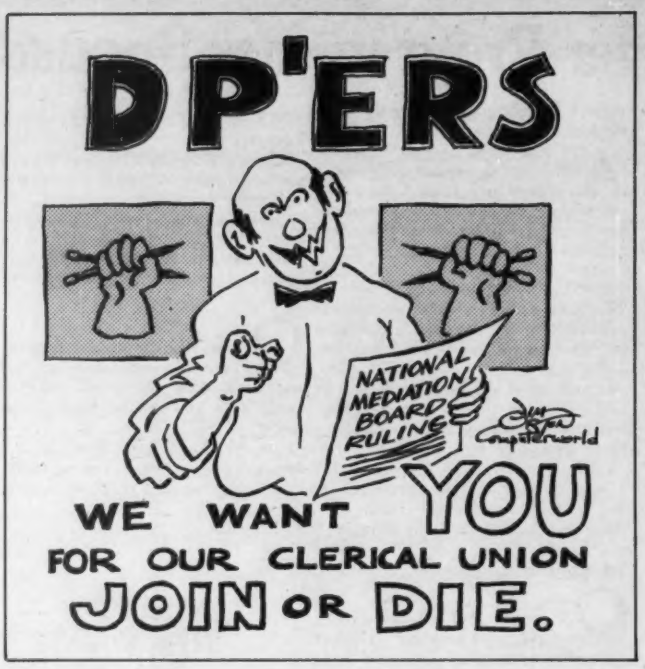
If it's difficult for a highly educated person such as an engineer, systems analyst, programmer or DP manager to keep from falling behind the times technologically, how much more difficult must it be for a typesetter or telegraph operator?

People should be prepared from childhood in school and the community for a working lifetime that might involve several career changes.

Further, it's time people in our industry — and especially in this country — did some meaningful work on this matter.

Apparently, little new is happening. Even at a major international conference like the one put on by the International Federation for Information Processing in Tokyo and Melbourne recently, little attention was paid to this very important social issue. The few individuals who did present papers on the subject did not have any new data or solutions to present. In fact, some of the references they were citing were 10 or more years old!

It's time we had a national effort to learn how society can gain the most from computers without causing massive job displacement. How about it?



DATA PAST

Five Years Ago
Nov. 12, 1975

WASHINGTON, D.C. — The Federal Communications Commission (FCC) sounded the death knell for the Data Access Arrangement (DAA). In a far-reaching decision that affected virtually every dial-up user with non-Bell System modems, the FCC ruled DAA-equivalent circuitry could be built into equipment beginning in April 1976.

— — —

NEW YORK — Agreeing with IBM that the judge hearing the government's antitrust suit against it had overstepped his procedural bounds, the Second Circuit Court of Appeals here delivered a gloved — but public — slap to Judge David N. Edelstein and the Department of Justice. The decision ordering the trial judge to vacate three of his rulings and orders was intended to limit the "irreparable damage" IBM counsel claimed its client's defense suffered as a result of Edelstein's actions.

Eight Years Ago
Nov. 8, 1972

NEW YORK — Only 10 years old, computer-based prognostication of election results got its biggest test this week as all three national television networks struggled to be the first to tell voters whom they had elected. This year's computer operations were the largest in their history, with the networks spending a combined total of more than $11 million on this election to correlate the election returns.

— — —

WASHINGTON, D.C. — The National Bureau of Standards launched a six-month study to determine the significance and impact of American Standard Code for Information Interchange (Ascii) as a federal DP standard. Under the federal standard, all new computers and related equipment brought into the federal inventory after mid-1969 were supposed to be Ascii-compatible, with the obvious hope that such compatibility would facilitate the swapping of information and programs between DP centers.

LETTERS

Misplaced Emphasis

It was with mixed emotions that I read the article by Bruce Hoard covering the Second National Meeting of Black Data Processing Associates (BDPA) in Washington, D.C. [CW, Oct. 6].

As an organization we were pleased to receive the national exposure. This is emphasized by the number of inquiries we have received from various cities requesting information and chapter requirements. We are, however, extremely upset and dissatisfied with the emphasis on racism with which the associated article was written.

The intent of Black Data Processing Associates is not to castigate the data processing industry nor individual companies for their past, present, real or imagined actions of discrimination. We resent any reference to us as an organization obsessed with complaining about the lack of social conscience or insensitivity of our industry.

We are a professional organization with an ongoing goal of self-improvement. Our purpose is to inform our members and assist them in improving their skills so that they might move upward in their chosen careers. That is our emphasis!

The opinions expressed by the individuals interviewed, who were not all BDPA members, are theirs and not those of their companies nor of Black Data Processing Associates. We have been contacted by many companies in the industry voicing concern about this article.

We are sending a copy of this letter to several of the companies that we feel were erroneously represented in the article. It is our hope that this letter stating the official position of BDPA will be given as prominent a location and position as the original article that generated this controversy.

As an organization we were extremely hospitable and open to the representative of *Computerworld* covering our meeting. It is my hope that the future relationship enjoyed by BDPA and CW will allow us to continue this policy.

Earl A. Pace Jr.
National President
BDPA
Philadelphia, Pa.

Don't Blame Programmers

I find it very difficult to believe Dr. Hamming's conclusion [CW, Oct. 20] that programmers are to be blamed for not keeping up with technology.

Why is there such a huge turnover of programmers in the industry? Of course, some programmers change jobs because of money, but associated with the money are also new challenges (at least as promised by the prospective employer).

I think much of the blame should be attributed to employers. I have been in the industry for 10 years and have changed jobs every two years. Each move I have made has been to avoid becoming obsolete.

There are some employers who will hire with promises, but once the programmer reports for work, the job description turns out to be mainly routine with "don't rock the boat" signs painted all over.

The programmer, after six months, is inevitably tamed to a point of frustration and starts chasing the rainbow again.

Some readers might say "but the company has priorities." I say that's fine, but don't look at the approaches through a needle hole.

In my opinion, the programming profession forces the programmers to be imaginative and technology frontier seekers.

People management is the key!

Howard Smith
Systems Analyst
San Diego, Calif.

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THE TAYLOR REPORT/Alan Taylor

RM-Cobol Shows a Real User Breakthrough

Twice during the past year this column has celebrated Cobol developments from independent software suppliers. Now a new Cobol has been released that is probably the most important one since 1960, when IBM joined Univac and others and allowed users to write transportable software. Truly it can be said that Cobol is gaining liberation in the 1980s.

The original transportability gain for users in 1960 was effectively canceled almost immediately when operating systems came into use. This made the compilers themselves become fixed and dependent upon operating systems.

Now a trade house that has for the past six years been successfully supplying Cobols to computer vendors ranging from NCR Corp. to Radio Shack is offering multi-operating system Cobol which again promises to provide users with real application transportability — the basic aim of Cobol since the beginning.

RM-Cobols

The Cobol manufacturer is Ryan-McFarland Corp., and the compiler sells, retail, at around $600 from the dozen or so retailers who so far have taken OEM licenses. The source language and intermediate codes are the same as any of the current RM-Cobols (including NCR 8200, Radio Shack Model II) and have also been fitted to the CP/M operating system issued by Digital Research, Inc., which is just about universal for micros, as well as a version of Unix.

Moreover, 6-bit supersets, as well as 8-bit versions, are coming by the end of the year, which will open up the popular mini area.

What is new, brand new, is that this Cobol marketing is based upon facing up to competitive products, rather than on monopolizing some more or less captive market niche, which every Cobol up to now has attempted to do.

This means that RM-Cobol is not tied to that of some particular operating system, or some particular group of hardware. Instead, the better and more widely it can run, the more different operating system and hardware environments that it can handle, the better its commercial success will be.

With an independent Cobol availability, users are in a stronger position, both in the selection of hardware and the availability of software. In hardware, they can make their choices based on direct merit, rather than having to take into account the lack, or lateness of Cobols promised ahead. In software, they will be able to use software suppliers whose products previously have not been accessible, without having to consider hardware and operating systems.

Millenium Not Here

Few developments, however, bring only ease and profit, and the RM-Cobol is not one of them. To start with, it is unlikely that this will be the only independent Cobol available to users. There is nothing technically unique about the new Cobol. It uses a set of primitive pseudocodes as an interface to specially written drivers connecting the codes to the appropriate functions in the operating system.

That's standard advanced technology and has been illustrated previously in this column. So there will be other independent Cobols. Users will have to rethink their decision-making processes.

Then again there is the question as to exactly what source compatibility there is between your current Cobol programs and any independent language. If your hardware supplier continues to provide the best bargain here, it is likely that most users will stay with that — unless there is a demonstrable mix-and-match capability of running both types of Cobol under the same job stream. And so on.

Currently, Ryan-McFarland have only six people on the project, headed by Michael Saccomano. This is going to be increased. The ability of this small staff to achieve their current status is an indication of the economic viability of the new approach, but it is not enough for the achievement of the technical possibilities. Not yet.

The "retailers" also are just getting organized. In some cases application packages written for other systems are being brought into RM-Cobol, and the conversion checked out. Marketing techniques and brochures will have to be defined and developed. All of this will take time.

Even the relationship of the RM-Cobol with the Ansi standard has not been checked with the U.S. government as yet. The definition is quite persuasive, including much Level 2 material. The history is also quite persuasive, as a number of the firm's customers have supplied copies for testing, quite successfully. Even the reason for not having done so — not having got around to it as yet — is understandable.

Despite understanding and reasonability, the fact remains that Ryan-McFarland Corp. has not provided publicity, and permitted periodic testing of, the certificates of equivalency of operation over different operating systems and different hardware configurations, which are a major requirement of such testing — *and* which happen also to be the major marketing points for the new venture.

These are all transient points, however. The offering of RM-Cobol marks a giant step towards users having the transportability that they have been promised for 20 years, without having to reconvert to the nature and whims of operating systems and hardware. The ability of the few currently involved, and the skill and record of the rest of the firm are shown by their successes thus far, and users can approach the product with confidence. Welcome, RM-Cobol!

(Users or potential OEMers can contact Michael Saccomano at (408) 662-2522, or write RM-Cobol, Ryan-McFarland, 609 Deep Valley Drive, Palos Verdes, Calif. 90274.)

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SOCIOLOGY OF COMPUTING/Robert L. Glass

The Pressure-Cooker World of Proposals

Most of us who love the technology of software don't often have occasion to tinker with political tactics along the way.

And those who do blend technology and tactics have varying degrees of success at it. This is the story about someone who tried — and failed.

Have you ever worked on a proposal? If you have, you know it's a tension-filled, technology-concentrated, write-your-arm-off-to-the-wrist kind of hardly-any-fun adventure. If you haven't, congratulations! Your life, whatever else characterizes it, has been protected from a destabilizing kind of experience. In the pressuer-cooker world of proposal preparation, strange things have been known to happen.

When Philip Tenderfoot first joined the Microsoftware House staff, he had never heard of proposals. In fact, it wasn't until Phil finished his 14-month stay on Microsoftware's contract to build a Pascal compiler for the first computer-on-a-thimble, that he realized there was anything to working for a software company besides writing software.

But at that point, he found out quickly enough. No one sits around idle between assignments at Microsoftware. There are proposals to be written!

After all, a small company like Phil's spends all of its time doing jobs for other companies. Most of those jobs result from competitive procurements. If you want to build a Cobol compiler for Z-Hawk Computers, you write a proposal telling Z-Hawk how good your Cobol folks are at cramming a massive compiler into a miniscule memory, send the proposal like an arrow into the air, and wait to see where it (and the Z-Hawk Cobol job) fall to earth.

Now Phil was a fairly fast study. He wasn't too far into his first proposal before he realized that appropriate technology is only a part of the content of a winning proposal. There is also price. You not only tell the other company how great you are, but how cheap as well. And that's a tough technological highwire to tread. In cost-trade studies, rare indeed is the result which has both quality and cost on the same side.

So by the time Phil was assigned to his third proposal, he felt like he knew proposal writing well enough to have earned his merit badge at it. That surge of pride may have proved to be his downfall.

This particular proposal was trickier than most. The request for proposal (RFP) had been issued by the National Energy and Transportation Department (most people called it, somewhat derisively, Neat) and it called for three related software products. Neat had made a quantity buy on some Quadranova Superstar computers, and they needed a generalized report generator, a payroll application and a high-level simulation language compiler for their Superstars. Fast!

Phil felt pretty good about Microsoftware's proposal. For one thing, they'd built a lot of compilers, including one or two for simulation languages. For another, they'd written so many payrolls that the Microsoftware folk used to joke that there was Fica running out of their ears.

But most importantly, Microsoftware had a big leg up on the report generator problem. They had written a proprietary, generalized one over the last year, and it was just now ready for use. Better yet, its specs matched Neat's RFP's requirements to a well-crossed "T."

Move to Tactitian

It was at this point that Phil Tenderfoot crossed the line from technologist to tactitian. Why not gamble Microsoftware's proposal, he thought cleverly to himself, on their off-the-shelf RPG?

The tactic Phil evolved *was* clever. The RPG would be a price leader. Their figures there would be tighter than a Cheryl Tiegs swimsuit. If it lost money? No biggee. They'd make it up on the payroll and the compiler. By drawing the RPG price highwire tight, and mildly overpricing the other two, Phil felt he'd end up in the low total bid position and still offer a top-quality product.

The next word from Neat seemed to bear out Phil's tactics. Microsoftware was in the finals. There were a few questions to be answered, concentrated mostly on the technical quality of the RPG, but they were a breeze.

It wasn't until the award was actually made that the roof fell in on Phil. And it fell in a most peculiar way.

The good news was, Microsoftware had won! Phil's hand fairly trembled with excitement as he read the award letter. But why, he wondered idly, were two other winners named?

His idle concern moved swiftly into deep concern, and then despair. Neat, he quickly saw, had split the award in three. Each winner had won only one of the software products to produce. Guess which one!

Now the guy who writes the proposal at Microsoftware often ends up doing the job. And nobody — but nobody — wants to spend six months explaining to a manager at weekly activity reports why he's overrunning his budget.

READER COMMENTARY/Jerry Cashin

'Plugged-In' Solution the Latest Industry Fad

The ascendancy of so-called local networks, along with their imminent standardization, has given impetus to the latest fad in contemporary information processing — the call to link together into some form of communicating entity even the smallest of our computing systems.

Now, there are circumstances under which such interaction within appropriate environments may be desirable and productive. But there are certainly counter-situations where marriage of a lone, personal microcomputer to a local or public data network is a distortion of common sense and functional utility.

Yet there is a growing clamor for the wired approach, the plugged-in solution to each and every processing situation, no matter how ludicrous such a convoluted policy may appear.

Who are the purveyors of this monolithic plan for universal networking, for invasion of computer user domains at all levels of activity?

Primarily it is the marketers of local networks and their associated brethren. They proclaim the apostate nature of any who would dissent at their demands for universality and conformance to the orthodoxy of network integration. They bluster phrases such as "efficiency," "capability expansion," "wider access," "information dissemination," "increased user resources" and so forth.

Operational Scenarios

There are operational scenarios where qualities like these are useful, perhaps even necessary. But there also remain many contrasting circumstances where independent, solitary system implementation is both logical and necessary. Examples abound in academia, field sites, laboratories, homes, industry and small business. The technical entrepreneur may function quite satisfactorily with his micro system in an environment totally devoid of external interface.

The frenzied automata, however, vociferously demand linkage, plugged-in interaction, a homogenization of individuality in order to further communication efficiency. Yet their entreaties should be rejected! Rejected by all but those multidisciplinists who require external access. Progress in this era of communication may actually depend on tuning out the network proselytizers.

Communications in our times may literally impoverish those who embrace its ethereal charms. Its incessant cacophany of sound, data and images is future shock revealed. Where is there analysis, meditative review, reflective awareness when explosive volumes of new data are persistently and pervasively entering our consciousness?

How does one think, not react?

How does one review, not absorb?

How does one actively incorporate, not passively accept?

How does one implement, not progress in a sea of inertia?

How does one retain creativity and a genuinely humanistic resolution?

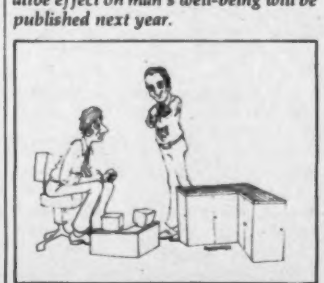
In many, many cases, one does these things just by pulling the plug, unwiring the network interface, restoring the individuality associated with an independent system. The exhortations of network salesmen that all smaller users out there should connect to their facilities is abhorrent. Within the virtues — and there are several — of the services they thrust at us are the harbingers of lost individuality.

We may fall prey to the allure of instant retrieval and far-flung access, the convenience of network resources, but it may not be all that it appears. What is initially perceived as expanding one's capabilities may actually result in a diminishment of independent development and progress.

If we have access to a larger system, it also has a measure of admittance to our own environment. It becomes, in a sense, an uninterruptable imposition. The network's demand for conformance and standardization could even alter matters of substance in the work being done, as well as mandatorily changing procedural conventions.

Let's slow the hype for universal networking and admit that there are some users who will be better off without it. In this context, a communication gap might be the best approach.

Cashin works for the Air Force Computer Acquisition Center and is a regular contributer to several trade publications. His forthcoming book describing the system's influence and its negative effect on man's well-being will be published next year.



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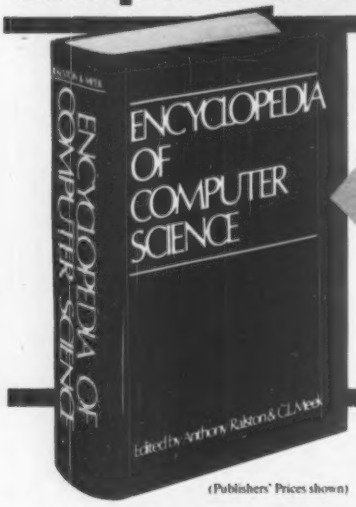

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When you chose a new 4300-type processor, it was to upgrade system performance and reduce ownership costs. Yet, if you select the wrong tape subsystem — a subsystem whose performance is not "balanced" with that of your processor — you can actually strangle throughput and reduce system efficiency. On the other hand, if you choose STC's new 4500 tape subsystem, you can achieve a balanced system, and get all the throughput and CPU utilization for which you've paid.

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The new STC 4500 is fully compatible with today's intermediate-sized processors, including IBM 360, 370 and 4300 series devices, as well as other comparable units. But more importantly, the STC 4500 incorporates speeds of 75 and 125 ips, and densities of 800 bpi (NRZI), 1600 bpi (PE) and 6250 bpi (GCR). This combination of high-speed and high-density permits the 4500 subsystem to deliver performance equal to that of your CPU, to help achieve a balanced system.

For example, if you compare an STC 4500 with today's streaming tape devices, there's no comparison at all. In data mode, a streaming tape will typically transfer data at a rate of about 20 kb per second, while the STC 4500 offers a data rate of 468 or 780 kb per second. When you use the STC 4500 to backup a high-performance disk, it outperforms 8809-type devices (see chart below) by a factor of six to one. If you consider total time, this expands to a differential of eight to one, and with 3410 subsystems, the difference is almost nine to one. In sum, the STC 4500 makes frequent disk backup a realistic and cost-efficient alternative — no matter your workload — and at your convenience.

Equally important, the 4500 subsystem also offers enhanced read/write reliability. Users who move from non-STC 1600 bpi (PE) to STC 6250 bpi drives and who take advantage of GCR blocking can reasonably expect an increase in megabytes processed per soft failure of 30 to 35 times that of PE, and an increase in gigabytes processed per hard failure of 18 to 20 times.

Reduced ownership costs.

Older, 3420-type tape subsystems deliver good performance in certain applications. But their price/performance ratio falls far short of that which you'd expect with a 4300-based system. In comparison, the STC 4500 — like a 4300 processor — was designed for use in any office environment. As you can see from the accompanying chart, this means a reduction of 40% or more in space, power, and air conditioning costs, and eliminates the need for raised flooring entirely. And in this age of spiraling inflation, this can be an important long-term consideration indeed.

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POWER (Avg. KVA)	5.12	3.08	40%
BTU/HR. (Avg.)	14,980	9,197	40%
SPACE (Sq. Ft.)	18.4	11.3	40%

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The new STC 4500 also gives you several important features you'll find on no other comparable subsystem.

For one thing, the 4500 is a tri-density subsystem. Thus, it eliminates the need for a separate, additional 800 bpi drive. This helps reduce your initial investment, as well as your total cost-of-ownership.

STC's new 4500 tape subsystem can be diagnosed either on-site or remotely. In either event, if one 4500 drive goes down, it can be diagnosed in-line, and serviced off-line without affecting the remainder of the subsystem's operations. Powerful, built-in diagnostics also help assure enhanced data availability. In fact, the STC 4500 has microprocessor-based diagnostics designed to make fault isolation faster and more effective by permitting the subsystem to be exercised in-line. And special "wake-up" diagnostics will exercise the memory, microprocessor, and interface at power-up to assure proper operation.

Proven STC technology.

The STC 4500 was designed around technology that has been tested and proved in some of America's largest, and most demanding, data processing shops. In fact, STC is far and away the world's largest supplier of high-performance tape subsystems for the big processor market. And in the 4500 tape subsystem, we've made all this experience and expertise available to the intermediate system user.

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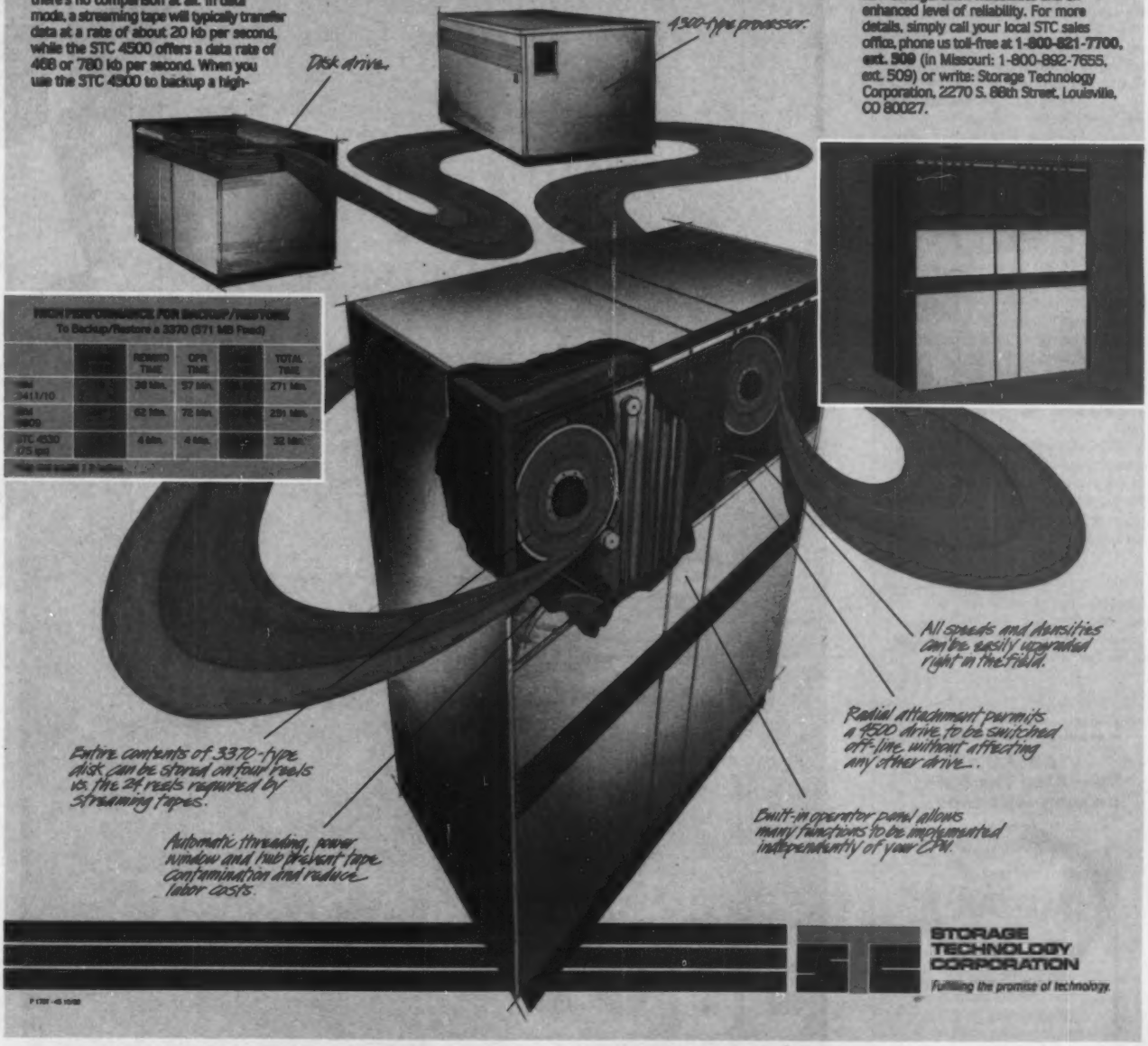
Find out for yourself how an STC 4500 tape subsystem can help you achieve a balanced system, reduced cost-of-ownership, new configuration flexibilities and an enhanced level of reliability. For more details, simply call your local STC sales office, phone us toll-free at **1-800-821-7700, ext. 509** (in Missouri: 1-800-892-7655, ext. 509) or write: Storage Technology Corporation, 2270 S. 88th Street, Louisville, CO 80027.


4300-type processor.
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All speeds and densities can be easily upgraded right in the field.
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STC 4530 .075 ips		4 Min.	4 Min.		32 Min.

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P 1787 -45 10/83

LETTERS

A Cobol Parable

The recent controversy over the efficacy and proper use of various Cobol control structures brings to mind an old story regarding the wisdom of taking a bottle of vermouth along on an expedition. With certain details altered, the same story might be considered apropos the current dispute.

Smith was preparing for a long and dangerous safari. As he reviewed the list of provisions he would be taking, his friend Jones looked on with disapproval.

"You've forgotten the most important thing," he said.

"What's that?" demanded Smith.

"A microcomputer with a Cobol compiler. It's essential in case you get lost."

"A Cobol compiler? What good would that be?"

Jones explained, "All right, suppose you're hundreds of miles from civilization. Your guides have all deserted you and you're alone in the jungle.

"So you sit down and bootstrap your microcomputer — and that's where the Cobol compiler comes in. It saves you. You just write a short transaction processing program, and from all over the jungle people will jump out at you crying, "That's no way to code a PERFORM structure!"

"And you're rescued."

Matthew Lena
Emeryville, Calif.

All for Gnat

"Gnat Desktop Unit Based on Z80 MPU" [CW, June 23] caught my eye. Being new to the data processing field, I'd like to ask some "stinging" questions about Gnat Computers, Inc.

Is it a fly-by-night operation?

Will the System 10 take a large bite out of my DP budget?

Will I be stung by hidden costs?

Will IBM take a swat at Gnat Computers?

Shouldn't the random-access memory of 65K bytes have read "65K bites?"

Will I have any problems with disk drives flying off at the handle?

Is the software easy to debug?

In addition to Dsect and Csect instructions, will the Insect instruction be available?

If I suggest the Gnat computer, will my manager tell me to bug off?

Nevertheless, now if someone asks me "What's the buzz?" my unscreened response will be Gnat Computers, Inc.

John Kokotiuk
Woodstock, Conn.

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What's In a Name?

I've been reading your paper for some time, and the reference in articles and advertisements to the terms "programmer," "senior programmer," "analyst," "software analyst," "programmer/analyst," "systems programmer," and "systems analyst" has finally got to me. What are commonly accepted definitions of those terms? What kinds of jobs do they refer to?

I began programming before "computer science" was invented, and at the place I work we do not have such titles as listed above. (The DP programmers, systems programmers, scientific programmers and doodlers — entry-level to senior — are all called "programmers" here.)

In the course of writing and debugging a program I have to analyze what's going on, both in my program and in various aspects of the computer system; I should think that programming and analyzing are inseparable. So an "analyst" isn't just someone who analyzes. What is it?

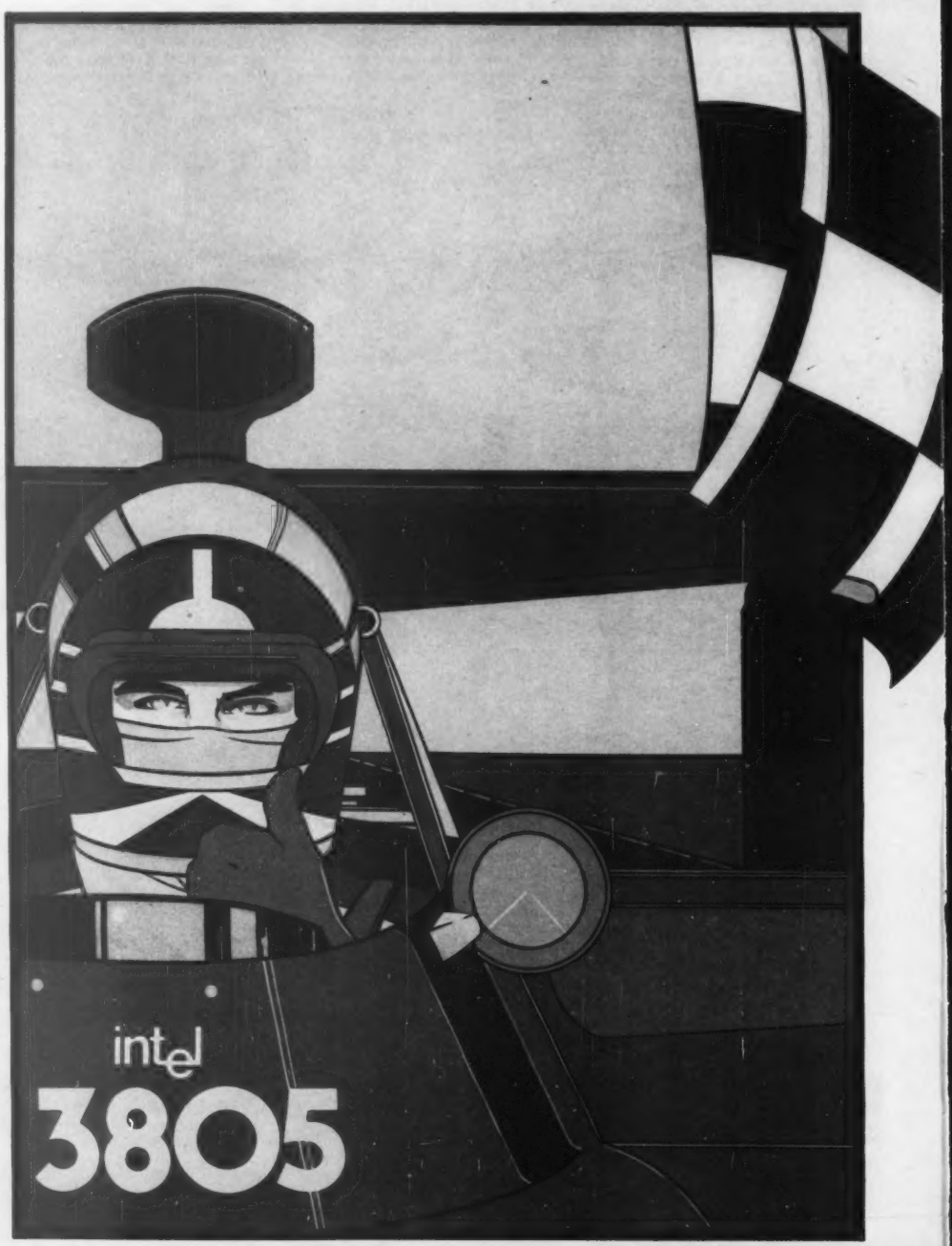
Carolyn R. Hunt
Livermore, Calif.

Job-Killer 'Myth'

Calvin Gotlieb's claim that "computers are job-killers" [CW, Oct. 13] proves that old myths die very slowly. The myth in this case is that the quantity of work to be done is static and that as machines cause the work to be done more efficiently, people are deprived of their share of that work.

Gotlieb cited "dozens of studies" showing people being thrown out of work by computers because companies were able to do the same tasks with fewer people. What he failed to point out was that this gain in efficiency enables companies to offer more goods and services at a cheaper price than before, increasing the value of the worker's effort and thus the value a worker — whether he remains at such a company or is forced to go elsewhere — gains from his salary. If fewer people are needed to do a task under new technology than under old, the greater productivity and availability of the workers under the new technology will give businesses an incentive to hire more people.

If it were true, as Gotlieb seems to believe, that a machine threatens workers when it lets one do the work two used



LETTERS

to do, then the ideal for workers ought to be a primitive economy in which their jobs are not "threatened" by any automation at all. Would Gotlieb claim that because it now takes only one man-day to drive a truck over a distance that would once have required several days of driving a horse and wagon, trucks have "thrown people out of work"? Does he object to the use of printing presses because they have caused unemployment among scribes?

It is obvious that these technological developments have not caused a static quantity of work to be done by fewer people, but rather have increased the amount that people can do with a given amount of effort. Computer engineers should not feel guilty, as Gotlieb suggests, that they have denied others the opportunity to do tedious jobs, but rather should be proud that they have made it possible to free people for more productive activity.

Gary D. McGath

Milford, N.H.

Double Identity

Yesterday I spent time on my lunch hour reading your Oct. 20 issue. The article by Phil Hirsch entitled "FCC, Congress Powerless to Hold Bell Accountable" was vividly brought to light late yesterday when I met with a Central Telephone representative.

I recognize Centel is an independent telephone company and, therefore, practices of Centel are not necessarily those that Bell would adopt, but here is the brief scenario of my meeting.

The central regional office of my employer, Tran Telecommunications Corp., is moving from Hinsdale, Ill., to Rosemont, Ill., to join our new parent firm, Amdahl Corp. Obviously, new telephones are required, and Russ Jordan, communications consultant of Centel, met with us to discuss telephones. I asked Russ if he represented the tariffed or unregulated side of Centel as we were buying the telephones. He said he represented both companies!

Upon my question of how does one do that, he replied, "I put my hours down depending on which side I'm representing." I couldn't believe what I heard and I just had to blurt out, "You are the epitome of the article in *Computerworld*." I apologized for using him as an example, but I couldn't help it.

The situation seems very clear to me for a representative's reporting of time to inflate the costs on the tariffed side and deflate the costs on the unregulated side. He responded, of course, that he wouldn't do that, but how can he even approach accuracy on how much time he spent on the "purchased" phones (unregulated) and how much time he spent on "lines and usage charges" (regulated). Well, Walter Hinchman appears to have identified the problem!

As a postscript, you would probably like to know that a new Centel tariff in service today makes purchase the only alternative for businesses. There is no more rental or lease of equipment from Centel. A businessman can third-party lease or buy and that's it!

Please don't ask me if one "buys" from Russ Jordan of Centel (regulated) or "buys" from Russ Jordan of Centel (unregulated)! There is only one Russ Jordan.

Clinton D. Warkow

Hinsdale, Ill.

If U Cn Rd Ths

It is getting to the point that unless one has a computer dictionary, one can't read *Computerworld*, with all the new abbreviations.

I have been in the computer business for more than 30 years and am familiar with many of the abbreviations, but the situation is getting worse and worse.

It would be nice if sometime CW would print a full glossary of these terms, including exact definitions.

Richard T. Austin

Fort Lauderdale, Fla.

Packed Zip Fields

A *Computerworld* article related to the nine-digit Zip Codes quotes Gary Whiting as saying "Mailing lists do not have adequate space for an expanded Zip Code on current files." I am certain many organizations have not "packed" the Zip Code field of five characters.

I am assuming that the new code will be nine numeric digits. By "packing" the field, one should be able to get the nine digits in the same physical space now occupied by the five digits.

If this technique is possible for a given user, it should save a significant amount of programming time in converting to the new Zip Codes.

G.H. Fochtmann

St. Louis, Mo.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

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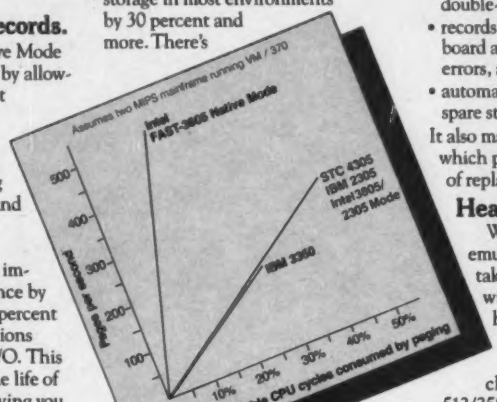

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READER COMMENTARY/James Hammerton

Structured Programming: A Little Deja Vu

Back in the beginning there was Flomatic; then there was Fact; later came Cobol. Back in the rosy but uncertain dawn of business DP, the proponents of those languages latched on to the idea that a programming language must be easy to read so that the user could attest directly to a program's functional correctness; easy to comprehend by successive replacement programmers so that the program could be maintained; and easy to change so that the program could be as dynamic as the business environment it purported to serve.

"Write it in English," Grace Hopper used to say, and she meant it. Some of us — a minority — believed. We embraced the idea of a standard higher level language as a major contributor to cost-effectiveness. We swarmed from the protection of our trenches into the no-man's-land of standardization. "Charge," said our leader — or, in honor of Captain Hopper perhaps it should be, "damn the torpedoes, full steam ahead."

The opposition was intense. In the name of preserving efficiency, not throttling creativity, the inhumanity of strait jacketing standardization, and programming professionalism, the opposition rallied its supporters. Many defected from our ranks; fleeing to the joys of assembly-level programming for minis, to the stimulating ramifications of APL, to the happiness of compiler and operating systems programming.

On the chosen battleground of business DP, disciplined progress by the Cobol troops was slow and measured in inches. Crossfire from established alternatives like Fortran and from IBM-only standards like PL/I threatened continually. From time to time, no-man's-land was illuminated by scintillating distractions such as APL and nouveau chick like Pascal.

Now, 20 years later, comes structured programming — the new revolution. It is said to be a potpourri of techniques; structured analysis, structured walkthroughs, chief programmer teams, continuous integration — presumably also structured — stepwise refinement (I wonder what that one looks like!) and whatever.

According to one definition, a structured program consists of blocks. The blocks can be combined using only three structural concepts — five, some say; six if you toss in a near version of one of the five.

Advocates assert that the Fortran language can be given a couple of simple extensions so that Fortran programs can be labelless and GOTO-less. Even Cobol programs can be structured. Now that's really counterattacking where it hurts.

The declared objectives of structured programming are various. The underlying one, however, appears to be the old three-pronged thrust — easy to read, easy to maintain, easy to change.

Discipline and Diversity

So, perhaps we should rejoice that discipline is triumphing over — or in spite of — diversity. Perhaps we should welcome abroad the disciples of Pascal, Watfor and APL. With a little encouragement perhaps they are ready to defect from the enemy and join us under our flag — our standard, so to speak.

But while some of us are smiling through our deja vu, we hear grumbling among the descendants of the users of Flomatic. A silk purse, they grumble, cannot be made out of a sow's ear.

Maybe they are right. Structured or not, for example, why would anyone choose APL to implement a basic business application? Why indeed? It is fun to write and even to test. But APL's file-handling capability is rudimentary — strictly a graft job. It has a certain power in its matrix manipulation which is not entirely irrelevant to business DP.

But its terminology is impenetrably mathematical — 'empty vector,' indeed! It is neither easy to read, maintain, nor change.

If you do not care for APL for business DP purposes, how about, say, Pascal? Too early to tell, you think? True, the question of a standard is only now being addressed. Also the question of standardizing is inevitably going to become entwined with some needed extensions to the language.

On the other hand, consider some of the advantages being claimed. One source asserts an advantage provided by enforcement of clear definitions of all variables and constants at the front of the program!

Now doesn't that sound like Cobol's Data Division? — Pedestrian, time-consuming, a bear to write, but a real contributor too, easy to read, easy to maintain, easy to change. Now you've really got me smiling through my deja vu.

My advice to the Cobol troops out there in no-man's-land is to stand your ground, wait for the flares to fade, consolidate the gains won over the last 20 years, then inch patiently forward incorporating any tested alternatives in the path of your advance.

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READER COMMENTARY/Joseph Rigo

Technical Manuals: Where Do You Begin?

Pity the poor introduction.

Every technical manual has to have one, but it is one of the most abused elements in the system development process. People try to make it serve too many purposes.

An introduction has a few simple jobs to do.

First, it provides a gentle entry point for someone who knows nothing about the system. We can be certain that this person knows nothing about the system for the simple reason that no one else reads an introduction.

The introduction's next job is simply to explain what the system does. Usually the system performs one big function and half a dozen lesser tasks or subfunctions. The introduction briefly describes each of these functions within the context of the reader's larger job.

Next, it introduces the cast of characters. These are the system elements the reader must know about. The items in the list depend on whether the manual is for an end user or a maintenance programmer.

For example, an end-user introduction may state that the system prepares the payroll, supports remote terminals in 17 states and bakes rhubarb pies for Aunt Beth in marketing. It identifies the elements as a set of function menus, a master file and a large brick oven. For more information about baking pies, see Chapter 8.

A maintenance programmer's manual would look at these elements, especially the "master file," quite differently. The end user is more concerned with menus, displays and reports.

Last Job

Each of the functions and elements has to be described — briefly. For this reason, the introduction is usually written last. It is very hard to summarize a topic in a few words until after you have written about it in full detail.

Commonly, however, the introduction could be written at any point. The timing doesn't matter because the writer doesn't say much of anything about the system.

"This manual is divided into three parts," the introduction starts. It goes on to describe the manual in glorious detail.

The sad truth is that no one cares about the manual except the writer. The reader needs information about the system and its use. Until that information has been presented, the reader isn't capable of appreciating the wisdom of the manual's organization.

An introduction should also be simple-minded. It covers everything superficially. It is no place for detail.

This is where Aunt Beth and her fellow reviewers cause trouble. They get copies of the draft for comment and correction, and the first thing they see is the introduction.

For years Aunt Beth has been complaining about too much salt in her rhubarb pies. Now she has a chance to do something about it.

She digs into the manual. At the first mention of the pie-baking function, near the middle of page one, she inserts a strong warning against using more than 1/4 teaspoon of salt. Underlined and in capital letters.

Other reviewers do the same. When the draft gets back to the writer, the introduction is cluttered with debris from years of anger, frustration and visions of a brighter world.

All for Nothing

Almost all of these inserts are in the wrong place. They make the introduction disorganized, confusing and unreadable. Even worse, they accomplish nothing. No one will ever see them.

The newcomer cannot handle detail in the introduction. He either skims over the warnings or he just gives up trying to make sense out of it.

Experienced users never look at the introduction. They open the manual in the middle and flip to one of the detailed reference sections.

If Aunt Beth and the writer really care about the salt level, they will keep the introduction simple. They will put the warning in Chapter 8 with the detailed baking instructions. This is where it will be seen — with no need for underlining or capitals.

The same problem occurs again when the maintenance staff takes over the manual. All changes are inserted at the front.

After a while, every topic is discussed in two places. The reference section at the back has the detailed, step-by-step instructions. The disorganized mess at the front has all of the latest additions and changes. Usually the two discussions contradict each other enough that people give up on the manual.

Computers can tolerate disorganized programs. People won't put up with them. They will avoid using a system rather than cope with a bad manual.

Meanwhile, Aunt Beth's problem is real. A warning in the right place may fix it. In the wrong place, the warning just causes trouble.

And no one likes salty rhubarb pie.

Rigo is president of Sysdoc, Inc. in New York.

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		Overall Satisfaction					Response Time					Up Time					Operating Instructions and Training					Languages and Compilers					Application Programs					Technical Support				
		WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P
ADP Network Services	5	3.4	3	1	1	0	3.2	2	2	1	0	3.6	3	2	0	0	2.8	1	3	0	1	3.0	1	2	1	0	3.0	1	3	1	0	2.8	1	2	2	0
Avco Computer Services	3	3.7	2	1	0	0	3.7	2	1	0	0	3.7	2	1	0	0	**	0	1	1	0	3.3	1	2	0	0	2.7	1	1	[illegible]	1	3.0	1	1	1	0
Boeing Computer Services Co.	5	3.6	3	2	0	0	3.8	4	1	0	0	3.8	4	1	0	0	3.6	3	2	0	0	3.6	3	2	0	0	3.6	3	2	0	0	3.6	3	2	0	0
Computer Sciences Corp.	3	3.0	0	3	0	0	3.0	0	3	0	0	3.3	1	2	0	0	2.7	0	2	1	0	**	0	2	0	0	**	0	1	0	0	3.3	1	2	0	0
Comshare, Inc.	6	3.5	3	2	0	0	3.5	3	2	0	0	3.3	2	4	0	0	2.8	0	5	1	0	2.7	0	4	2	0	3.4	2	3	0	0	3.0	2	2	2	0
Control Data Corp. (Cybernet)	3	3.0	1	1	1	0	2.7	1	1	0	1	3.3	1	2	0	0	3.0	1	1	1	0	**	1	0	1	0	3.3	1	2	0	0	2.7	1	1	0	1
General Electric Co.	12	3.1	3	7	2	0	3.2	4	7	0	1	3.6	7	5	0	0	2.8	2	6	4	0	3.2	3	7	1	0	3.0	2	6	2	0	2.8	1	7	4	0
Interactive Data Corp.	3	3.0	1	1	1	0	2.7	0	2	1	0	3.3	2	0	1	0	2.7	0	2	1	0	**	0	1	1	0	3.0	1	1	1	0	2.7	0	2	1	0
McDonnell Douglas Automation Co.	3	2.7	0	2	1	0	3.0	1	1	1	0	3.0	1	1	1	0	3.0	1	1	1	0	**	0	1	1	0	3.3	1	2	0	0	3.3	2	0	0	1
National CSS, Inc.	7	3.3	3	3	1	0	3.3	3	3	1	0	3.6	4	3	0	0	2.8	2	4	0	0	2.8	2	4	0	0	3.4	3	4	0	0	3.3	3	3	1	0
Optimum Systems, Inc.	3	3.0	1	1	1	0	3.7	2	1	0	0	3.3	2	0	1	0	2.3	0	1	2	0	3.3	1	2	0	0	**	0	2	0	0	2.7	1	0	2	0
STSC, Inc.	3	3.7	2	1	0	0	3.7	2	1	0	0	4.0	3	0	0	0	3.0	1	1	1	0	3.3	1	2	0	0	3.0	1	1	1	0	3.3	1	1	1	0
The Service Bureau Company	15	3.2	5	9	0	1	3.1	2	12	1	0	3.5	7	8	0	0	3.1	2	12	1	0	2.9	1	10	2	0	2.9	1	10	3	0	2.6	1	8	3	2
Tymshare, Inc.	3	3.3	1	2	0	0	3.0	1	1	1	0	3.3	1	2	0	0	2.7	0	2	1	0	3.3	1	2	0	0	3.3	2	0	1	0	2.7	1	0	2	0
United Computing Systems, Inc.	9	3.0	0	9	0	0	3.1	1	8	0	0	3.0	1	7	1	0	2.9	1	6	2	0	3.0	2	4	2	0	3.2	3	5	1	0	2.9	1	7	0	1
All Others	29	2.9	4	19	6	0	2.9	7	12	8	1	3.0	7	15	6	1	2.7	4	13	10	2	3.3	8	13	2	0	3.1	8	12	5	1	3.0	11	7	10	1
GRAND TOTALS	112	3.1	32	65	14	1	3.1	35	59	14	3	3.3	48	53	10	1	2.9	18	62	28	3	3.1	25	58	13	0	3.1	31	55	15	2	2.9	31	45	29	6

Datapro Chart

By Rita Shoor
CW Staff

DELRAN, N.J. — STSC, Inc. and Avco Computer Services, Inc. tied for first place in terms of users' overall satisfaction with remote computing services (RCS) in a recent survey made by Datapro Research Corp. here.

In the same category of overall satisfaction, McDonnell Douglas Automation Co. came in last with a rating of 2.7.

Both STSC and Avco received scores of 3.7 on a scale where four points were given for an "excellent" rating, three for "good," two for "fair" and one for "poor." The weighted average calculated from these results is listed on the chart above. In the places where two stars appear, the rating was considered invalid because fewer than three responses were received.

STSC was also rated No. 1 by its three user respondents in the "uptime" classification with a top score of 4.0. However, the same users gave the company a comparatively low score for its application programs.

Similarly, Avco maintained consistently good ratings except for the application programs category, where its score of 2.7 was the lowest of the firms receiving scores. (Note that averages were not calculated for Optimum Systems, Inc. and Computer Sciences Corp).

The high score for applications programs provided by the RCS

(Continued on Page 58)

'Dpro' Disk Pack Reorganizer Out

RESTON, Va. — Software Corp. of America is offering a disk pack reorganizer that reportedly makes disk pack reorganization easier.

Called Dpro, the package supports OS/MVT, OS/MFT, OS/VS1, OS/SVS and OS/MVS environments. It also supports IBM's 2301 drum, 2302 disk, 2303 drum, 2305 drum (models 1 and 2), 2311 disk, 2314 disk and 3330 disk models.

The Dpro data collector and analyzer provides comprehensive performance and analysis data with minimum overhead, its vendor claimed. The analysis can be directed to a single file, to all files on a single volume or to all files on all volumes being accessed by a single computer system.

Reports are generated that show how volumes and files are being accessed and how these files should be rearranged so they can be accessed more quickly.

The unit costs $2,500 for a licensing fee, from P.O. Box 2695, Reston, Va. 22090.

Utility Aids JCL Operations

SPRINGFIELD, Mo. — A utility that provides operators with a means of reading Job Control Language (JCL) directly into the Power reader queue from IBM's Source Program Maintenance On-Line (SPMOL) program data set is being offered by Philinda Software.

PS-Submit can be used whether or not CICS is up or using that data set, the vendor said.

The utility provides up to 25 nested includes. It has no production card decks to drop or lose to a fire or other disaster and, since JCL is kept on the PROMGDS, SPM's facilities are used for backup and updating, the firm said.

The utility costs $425 and is available from Philinda Software, 527 W. Kett, Springfield, Mo. 65803.

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Univac 1100 Programs Made For Chemical Applications

BLUE BELL, Pa. — Univac has reached an agreement with Bonner and Moore Management Science, a Houston, Texas-based software house, to provide three software packages aimed at the oil refinery, petrochemical and chemical applications. The three programs, Gamma 4, the Refinery and Petrochemical Modeling System (RPMS) and Events, run on Univac's 1100 series mainframes.

Gamma 4 is a general-purpose data base manager for linear programming data as well as a generator for linear programming matrices and reports. It interfaces with Univac's FMPS for linear programming solutions.

RPMS is an application generator used for the formulation of linear programming problems in the refining, petrochemical and chemical industries. The package is written in the Gamma 4 language and converts problem statements written in engineering and economic terms to linear programming models, according to Univac.

Gamma 4 costs $642/mo.; RPMS costs between $60,000 and $150,000, depending on modules selected; and Events costs $15,000. Both RPMS and Events are available for a one-time licensing fee.

Univac can be reached through P.O. Box 500, Blue Bell, Pa. 19424.

For Small Business

IBM Retail System Debuts

HELENA, Mont. — A small retail business software system that interfaces the IBM 5120 processor to the IBM 5260 retail system is being offered by Advanced Business Computing Corp.

The Retail Sales and Inventory Management Systems (Rsims) was designed to process sales transactions logged on the IBM 5265 point-of-sale terminal's diskette.

A variety of reports are available, including several different inventory, sales and profit reports. The system will also automatically upgrade inventory stock levels with any sales or returns logged into the 5265, the firm said.

Rsims was designed so the operator can use either the inventory or retail subsystem independently. Both may also be used on a stand-alone basis, according to the vendor. As many as 10,000 different inventory items may be stored on one diskette and up to four different pricing levels are possible.

A single license fee for the system is $2,950. The firm can be reached at P.O. Box 654, Helena, Mont. 59601.

'Zort' Facility Works As RT-11 Utility

NEPEAN, Ont. — Logicaid, Ltd. is offering a sort facility for the Digital Equipment Corp. PDP-11 that can be used as a standard RT-11 utility or be invoked in an RT-11 background job by subroutine or macro call.

The sort, called Zort, can be invoked from Macro-II, Fortran, Dibol and DBL programs, the vendor said.

The package costs $250. Logicaid is at 97 Craig Henry Drive, Nepean, Ont., Canada K2G 3S8.

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STSC, Avco Top Survey

(Continued from Page 57)

firms was received by Boeing Computer Services Co., which scored only a tenth of a point behind the two first-place companies in overall satisfaction.

Noteworthy Ratings

Ratings for application stories are noteworthy, Datapro said, because while cost and accessibility were considered almost equally important criteria during the users' evaluation process, the applications available from the vendor were also described as being of high, although secondary, importance.

Datapro speculated that the high priority given to applications availability might be interpreted as indicating that most of the respondents rely on the programming expertise of the remote computing service rather than assume the expense of developing their own tailored applications.

Based upon a question about the type of applications that were being processed by the RCS, it appears that these off-site services are being used extensively for mainstream DPO applications involving accounting, financial planning, marketing and manufacturing as well as the traditional engineering and scientific calculations.

Besides its applications programs, Boeing received high scores for its response time, operating instructions and training, languages and compilers and technical support from its users.

Most Responses

The Service Bureau Co. (SBC) and General Electric Co. were the firms with the largest number of users responding to the survey — 15 and 12, respectively.

Six of the 15 RSC firms represented by three or more users scored higher than SBC's 3.2 rating, which in turn was immediately above GE's 3.1 score in overall satisfaction. SBC represented the low end of the scale in the technical support category with a rating of 2.6.

Survey results were based upon some 72 respondents to a Datapro questionnaire that solicited user experience and ratings with remote computing and time-sharing services.

Because 40 of the users were customers of more than one service, separate ratings were provided for a total of 112 responses.

The report, which includes various comparison charts and a look at what to expect from the remote computing industry in the next few years, costs $15.

Datapro is located at 1805 Underwood Blvd., Delran, N.J. 08075.

'Ctop' Version 2 Targets Terminals Under CICS 1.4

DALLAS — Version 2 of the CICS Transmission Optimizer (Ctop), a data stream compression package for remote terminals running under CICS 1.4 or above, has been released by H&W Computer Systems, Inc.

With Ctop installed, all applications approach the transmission efficiency of ALC programs using native mode 3270 conventions, H&W said.

As Ctop automatically removes blanks and redundant sequences, it simultaneously inserts 3270 control characters to present a compatible screen or print line to data stream and SCS terminals, according to the firm.

Intercept Code

Ctop's CICS intercept code is completely dynamic and Ctop is installed, activated and deactivated at any time without reloading or affecting the normal operation of CICS, the firm claimed.

Various statistics modes present displays of the overall network and individual terminal transmission savings. Several user-defined variables to control the compression algorithms and the overhead are provided.

Ctop reduces the transmission overhead associated with such productivity aids as command-level Cobol, Taps, UFO, BMS and DMS. The compression ratios vary from 12% to more than 60%, H&W said.

Ctop provides a 5% to 20% reduction for most native mode 3270 applications, a 20% to 50% reduction for BMS- and DMS-based applications and up to 60% reductions for print lines, the firm said.

The site license for Ctop is $1,900, and source libraries can be obtained from H&W at 1750 One Dallas Centre, Dallas, Texas 75201.

Prime 50 Gets Interpreters Giving IBM-Type Functionality

PONTIAC, Mich. — Mips Software Development, Inc. has unveiled two APL interpreters with IBM-compatible functionality for Prime Computer, Inc. Prime 50 series computers.

APL/Large Workspace (APL/LW) and APL/Large Workspace Shared Files (APL/LWSF), provide functionality corresponding to IBM's VSAPL and APLSV and are the industry's first commercial APL offerings on a 32-bit mini, the vendor claimed.

Both products support the features of APL found on other implementations, including all APL operators, system variables, system commands, I-Beam functions and system functions. Interpreter efficiency is promoted by the internal use of atomic progression vectors and count logic for multiple references to similar blocks of data, a spokesman said.

Compatible Systems

The shared-file system on APL/-LWSF is compatible with file systems of the major APL time-sharing companies for ease of conversion to Prime. In addition to the component files used widely by time-sharing companies, the product also supports binary sequential and Ascii sequential files.

APL/LW licenses for $8,900 and APL/LWSF for $11,500, the vendor said from Suite 202, 1899 Orchard Lake Road, Pontiac, Mich. 48053.

Package Aids Manufacturers

ANDOVER, Mass. — Software International's on-line, "closed-loop" Manufacturing Resource Planning (MRP) System is now available for the Hewlett-Packard Co. 3000 and Prime Computer, Inc. and Microdata Corp. processors.

The Net Change MRP System was designed to give greater management control over inventory costs, production schedules and materials by reflecting the actual status of the operation at all times. Engineering changes, unanticipated scrappage and inventory adjustments are all observed, a spokesman said.

The functional capabilities for Master Production Scheduling (MPS) permit master scheduling at any, or at multiple levels of the bill of material, the vendor claimed.

The Shop Floor Control with Capacity Planning Subsystem was designed to extend system capabilities to more thoroughly support control of shop floor activities.

The system is priced from $20,000 to $200,000, depending on computer configuration, the vendor said from Elm Square, Andover, Mass. 01810.

Transaction Journal Joins Banktran Line

TRUMBULL, Conn. — Bunker Ramo Corp. has added a transaction journaling package to its Banktran software line for the Bank Control System 90.

The Electronic Journaling Package/-Standard Transaction Package (EJP/-STP) can operate within mainframe protocols of IBM 3270 in bisync or SDLC modes or on Burroughs Corp.'s TD700 or TD800 units.

The package allows users to record each transaction on a disk file and project it, when called, on a user's CRT terminal screen, the vendor said.

The program is a no-charge addition to the Banktran package from 35 Nutmeg Drive, Trumbull, Conn. 06609.

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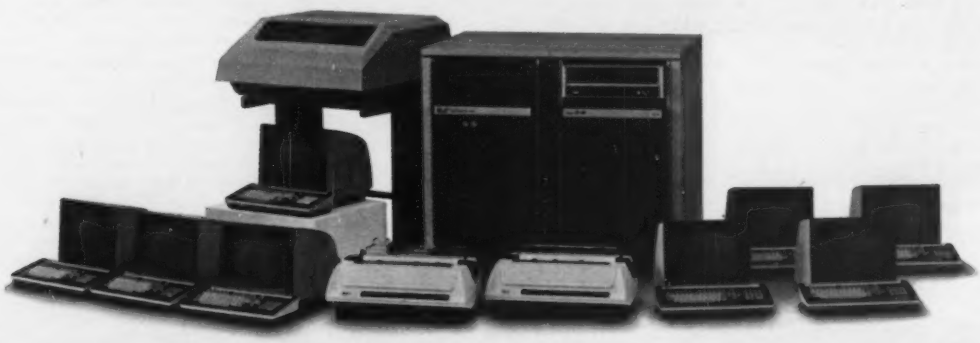

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McCormack & Dodge Enters Mini Field

System/34 Users Get 'GL Plus' Release

NEEDHAM, Mass. – McCormack & Dodge Corp. has entered the minicomputer field with the release of its latest financial software package.

The System/34 version of the G/L Plus general ledger/financial analysis system is said to allow IBM minicomputer users to utilize the vendor's software previously available only to large mainframe users.

The package reportedly features such components as unlimited network hierarchy, error recycle capabilities, on-line data entry and edit, on-line data collection and report writers.

G/L Plus System/34 serves both stand-alone or network applications, according to the vendor. In developing G/L Plus for the System/34, the same programs that were run in 128K bytes for mainframe packages have been designed to run in 64K, the vendor said.

HP 3000s

The package – written in Ansi Cobol – is also available for Hewlett-Packard Co. Model 3000 computers. G/L Plus System/34 costs $29,500; an introductory price of $25,000 applies through Dec. 25.

McCormack & Dodge is at 560 Hillside Ave., Needham Heights, Mass. 02194.

Package for PDP-11s Updated

FARMINGTON, Conn. – Computer Covenant Corp. has announced Version 2 of its manufacturing package for small to medium-size Digital Equipment Corp. PDP-11 processors.

The package includes controls for materials inventory, bill of materials maintenance, job costing, labor distribution, factory scheduling and capacity planning, according to the vendor.

The next version of the package, already under development, is slated to include computer-aided design and computer-aided manufacturing.

The package costs $20,000, the vendor said from 790 Farmington Ave., Farmington, Conn. 06032.

'PMS' Tracks Team Progress

ATLANTA – A software package that provides the basic information requirements for control of large or small project teams is being introduced by Escape, Ltd.

The Project Monitoring System (PMS) provides weekly reports that are based on an original schedule and a revised estimate-to-complete. Schedules are developed for each project team member consistent with the overall time frame and estimated effort.

In addition, each week, team members enter their actual hours and reestimate the effort required to complete the activity. Reports for each team member are produced showing estimating and scheduling variances.

The users manual explains the concepts in more detail and shows how to install and use the system. The package can be purchased for $125 and the source code (Ansi-66 Fortran) is included.

Escape, Ltd. can be reached at P.O. Box 18797, Atlanta, Ga. 30326.

'Solos' Targets IBM, DEC Minis

CLAYTON, Mo. – An order entry and processing system for medium size manufacturers and distributors is available from STS, Inc. It is suitable for Digital Equipment Corp. and IBM System/34 computers.

Solos, is task-related and automates and coordinates each function from entry through picking, shipping to invoicing, and collection of receivables, the vendor claimed.

The system is especially suited to handle situations where the supplier sells to large national retail organizations, typically against blanket orders.

The one-time license fee is $35,000, the vendor said from Suite 604, 7751 Carondelet, Clayton, Mo. 63105.

'Docs II' Features Financial Analysis

MANCHESTER, N.H. – An enhancement to general ledger software that allows analyses of financial trends and also generates all Aicpa financial reports is being introduced by Infotecs, Inc.

The Infotecs Docs II enhancement features income statement and balance sheet programs that allow reporting of up to 30 profit centers in any combination. It can generate profit center comparison, comparative income statement trends, balance sheet trend, cash flow trend and statement of change trend reports.

The enhancement provides a work sheet with subtotals and expanded trial balance net change capability, permits any report in a new fiscal year to be run before closing the past year and allows comparisons with preceding years. The system was designed for the vendor's Control Center 2 expandable microcomputer or its IMP system.

Part of the General Ledger System for Accountants, the Docs II enhancement costs approximately $400/mo including hardware from One Perimeter Road, Manchester, N.H. 03103.

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The Menace of Micros

By David F. Stevens

One of human beings' more popular pastimes has always been the prediction of the end of the world. Some predictions, such as the Armageddon of the Revelation of St. John, are the result of inspiration, divine or otherwise. Others, such as the original Malthusian prediction or, more recently, those of the Club of Rome, have arisen from the development of input/output models of greater or lesser accuracy. A third category, one of the favorites of the disaster school of science fiction writers, springs from the uses and abuses of technology. We are concerned here with one of these.

There are several standard avenues down which we can follow technology to our destruction. The first proceeds from the laboratory of the mad, misunderstood or frustrated scientist. This road, exemplified by Dr. Frankenstein's creation, has often not been followed to the end (that is, the good guys often win), although the potential is always there.

The second major avenue is that of technology out of control. It has three major branches: the accidental catastrophe, the unforeseen consequence and the deliberate seizure of control by the technological creation. The computer that raped Julie Christie in order to produce progeny in the movie "Demon Seed" is a modern example of the last of these.

A well-traveled byway, which is often related to one of the above, is the mutual annihilation drama: for it is often started by a mad scientist or soldier (Dr. Strangelove) or an accident or act of God (the string of coincidental failures that started it all off in *Fail Safe*).

The last major theme of technological destruction is that of overdependence of technology, to the extent that man loses some essential skill, mental toughness or the physical strength to survive unaided (the big-headed intelligentsia encountered in *The Time Machine*, for instance).

In What Sense 'Demise'?

Before I examine the particular track down which the microcomputer will carry us, however, I would like to explain what I mean by the phrase "the demise of Western civilization." And I will begin *that* by explaining what I *don't* mean.

In a trivial sense, every major technological advance has destroyed the civilization that existed at the time of its introduction into everyday life: the steam engine pushed us out of the fields and into cities, the automobile out of the cities and into the suburbs. The movies gathered us in huge crowds in darkened halls, television returned us to our own — darkened — living rooms. The compass and chronometer made intercontinental travel possible, the airplane makes it trivial and the present advances in communication technology can be expected to make it unnecessary.

This is NOT the demise I mean.

The tapestry which is Western civilization is the result of a continuous — but perhaps not always monotonic — developmental process that has been going on for thousands of years through all the vicissitudes such a span of time implies. Not all of its threads have been continuous or constant. The relative roles of "science" and "religion," for instance, have been at times united, at times in conflict; when in conflict, each has had its times of supremacy.

Some threads *have* been continuous, however. It is my belief that some of those persistent threads have been essential, that without them Western civilization — the civilization that developed the microcomputer — could not have come into being.

It is also my belief that one of the consequences of the development of the microcomputer will be the severance of one of the most crucial of these threads. Furthermore, I believe that the ensuing disruption will cause the whole fabric to tear in an irreparable fashion. That the result will be the end of the human race or even the end of civilization I much doubt, although the possibility should not be dismissed out of hand; that it will be the end of Western civilization I have no doubt whatsoever.

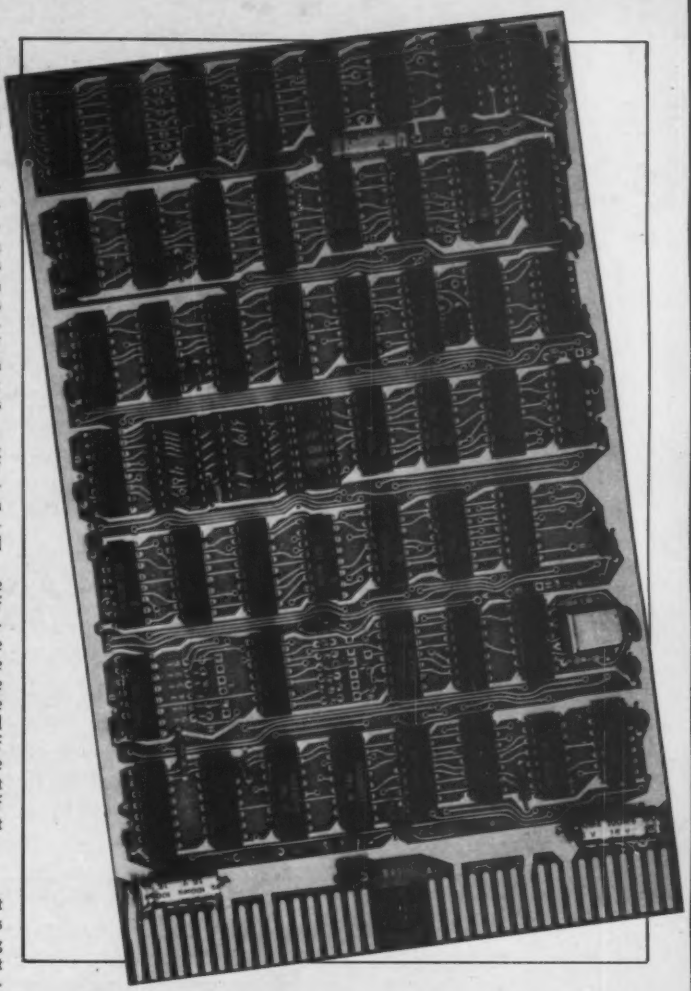
How It Won't Happen

There is common speculation about at least four possible dismal futures the microcomputer can help to bring about: total unemployment, the revolt of the robots, the misapplication of genetic engineering and the ultimate Terminal Man. I will begin by dismissing them.

Total Unemployment. This particular specter has been raised with the introduction of each new labor-saving device since time began (the log-rollers probably protested the invention of the wheel), and each time, in fact, quite the reverse has prevailed. The spinning jenny may have done the work of 1,000 women, but hundreds of thousands were eventually needed in the mills. The automobile may have put the horse out of business, but Henry Ford saw to it that many more mechanics are needed than blacksmiths, many more oil industry personnel than haymakers. The computer itself was hailed (or cursed) as the end of any of a number of occupations; the computing industries now support many more people than the computer has displaced.

In the actual event, it is the nature of

(Continued on In Depth/6)



Every revolutionary technology has been accompanied by Cassandras who prophesy the end of the world. But unlike Cassandra, they have all been wrong.

With the microcomputer, a new generation of Cassandras is appearing. They too, for the most part, are wrong. Their error is not in their conclusion — for the microcomputer *will* bring about the end of Western civilization — but in their concentration on technological consequences.

It is rather a *social* consequence — the willful disintegration of society — which will be the motivating force.

But Cassandra's tragedy was that no one listened to her.

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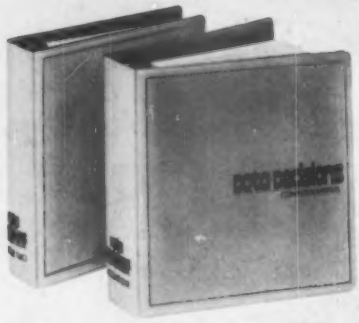

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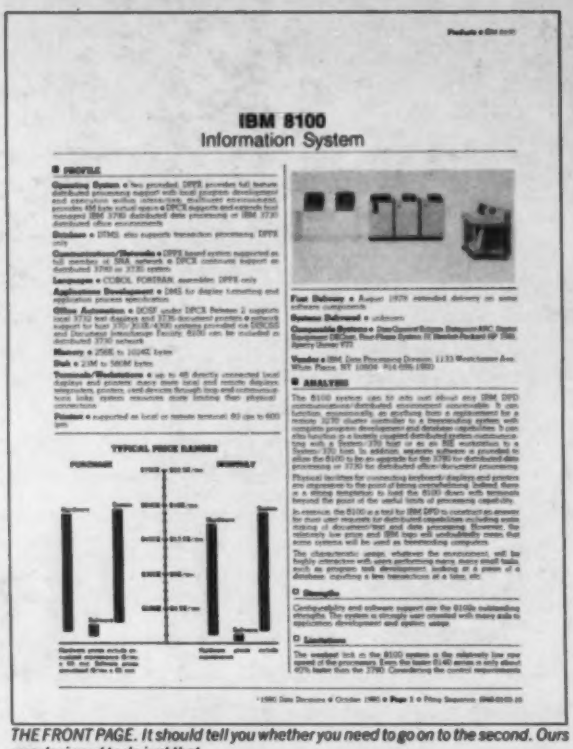

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IN DEPTH

(Continued from In Depth/1)

the work that changes, not the size of the work force. While it is true that each new tool has displaced some workers from traditional tasks, it is also true that each new tool has encouraged humans to attempt ever more difficult challenges and these new challenges have led to totally new occupations.

There still remains an ample supply of problems that are beyond our capacity: real-time weather prediction, positive weather control, the domestication of the earthquake and the volcano, colonization of the moon, regeneration of lost or broken limbs or organs — the list is endless. One assumes that the microcomputer will contribute in some measure to the solution of some of these problems or their preliminaries and in so doing will generate whole industries even the science fiction folk have not yet dreamed of.

Furthermore, the microcomputer will help combat unemployment in another, more important, way by providing opportunities for the previously unemployable. A few of the contributions in this area are:

- Artificial voices for those who cannot speak.
- Workstations for the sightless.
- Simpler and finer controls for prosthetic limbs.
- Communication for those paralyzed by stroke.
- Augmentation of brain power for the mentally handicapped (thus reversing the traditional division of labor between human and machine).

Again, I am sure this list is incomplete and the next decade will see advances beyond my wildest speculations.

As an aside, I might note that there are two opposing schools of thought on the unemployment issue. One is implicit in the term "universal unemployment"; the other might prefer to use "opportunity for expanded leisure." Whether you find the absence of labor to be a Utopian situation and devoutly to be wished, or whether you believe that it is only the Devil who makes work for idle hands, I believe you are worrying about the wrong problem. The microcomputer will not put the human race out of work.

The Revolt of the Robots. There are those who think such a thing could not happen because of the Asimovian Laws of Robotics. There are also those who think the robots may never hear of Dr. Asimov. This section is addressed to the latter group.

It seems to me that the principal prerequisite for a true Revolt of the Robots is the simulation of the human brain in very nearly equivalent volume and without cryogenics. (I can think of no creation more dependent upon the maintenance of a high technology than a cryogenic brain. The miniaturization necessary to get both the brain and its cooling factory into some sort of reasonable volume is awesome to contemplate.)

However, let us for the sake of argument assume the occurrence of a Revolt of the Robots. I claim that in the absence of the annihilation of the human race, such a revolt will *not* end Western civilization, *regardless of which side is victorious*. Obviously, if humans win, they will repress — and possibly lobotomize — the robots. (This will lead to the creation of the Society for the Prevention of Cruelty to Robots [SPCR], which will work diligently to improve the conditions of robot life.)

It is not in people's nature to turn their backs on a convenience simply because it is recalcitrant. Humans will therefore NOT extirpate the robots, but may overspecialize them and try to deny them any interrobot communication in an attempt to keep them under control. Either we will succeed or we shall have had a successful Revolt of the Robots.

In this case we shall have a situation in which robot is master, human is slave. This event will undoubtedly slow the progress of Western civilization, but it is unlikely to result in its end. There are two major reasons for this. First, because the robots are unlikely to do other than simply reverse the original roles of robot and human and maintain the existing civilization. But more important, because slavery has been an important concomitant of much of Western civilization from its very beginnings in ancient Greece.

The human race knows how to deal with slavery and how to survive serf-

(Continued on In Depth/8)

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IN DEPTH

(Continued from In Depth/6)

dom. Humans have been subjected to many forms of mental and physical enslavement including domination by conquest, by fear (of this world or the next), by economic chicanery (indenturing and the company store), by patronization, by mass hysteria and by drugs. The species has always survived.

And while history shows that we don't study it carefully enough to avoid the pitfalls of the past, it also shows that we continually climb out of the pits and are occasionally somewhat the better for the experience.

A successful Revolt of the Robots would simply be yet another pit, which would not contain us for long. It would also not materially change the outward attributes of Western civilization, but merely provide, temporarily, a new set of beneficiaries.

A final opinion: Unless and until the robots develop a sense of humor and the ability to act irrationally, they will never understand humans well enough to dominate them. In any case, whether or not the microcomputer brings about the Revolt of the Robots, the Revolt of the Robots will *not* bring about the demise of Western civilization.

The Improper Application of Genetic Engineering. This whole area is such an emotional one that it is probably best if I begin by stating a prejudice and a presumption.

1. I am opposed to genetic engineering on a number of moral and philosophical grounds, none of which is germane to this discussion. The opposition itself may be germane, however, for it may distort my view of this portion of the future.

2. I believe it is going to happen, soon, and that the microcomputer will play a major role.

Experiments in genetic engineering will go forth, with or without the blessing of the legal, social, religious or professional establishment. The essence of human history is the posing of ever more difficult tasks and questions which, when once posed, nag at humanity until they are accomplished or resolved.

Genetic engineering is but the logical extension of earlier work in the biological sciences. Whether or not we approve of genetic engineering, we are standing on its threshold, and humankind is not known for pausing at such thresholds for reflection. The threshold, then, will be crossed and the microcomputer will play a part. What then?

Almost certainly there will be some great disasters and perhaps a giant stride forward or two. (I find it impossible at this juncture to imagine which direction might be construed as "forward.") But neither the triumphs nor the disasters will rend the very fabric of Western civilization. Pretty much by its very nature the changes wrought by genetic engineering must be slow ones, and Western civilization has shown itself to be quite adept at accommodating itself to slow change.

The effect of genetic engineering on Western civilization will be less profound and more gradual than the effect of television.

The Ultimate Terminal Man. The Ultimate Terminal Man, as a result of the implantation of microcomputer-controlled sensors, receivers, servos and other mechanisms, will be capable of more than human operation but possess less than human volition. This will not be a new phenomenon, but merely a substitution of microelectronics for the psychological, hypnotic and chemical means that have been used for such ends for centuries. The Ultimate Terminal Man is thus seen to be a form of robot constructed from rather perishable material and with rather high maintenance costs; the discussion of the Revolt of the Robots, therefore, pertains to this case also, leading to the same conclusion.

In summary, while it is indisputable that the microcomputer can accentuate these four threats, they are not really new ones, and Western civilization can be expected to survive them. One should always remember that the Good Guys will have micros, too!

The Real Reason

The real reason none of the situations described above will come to pass is that Western civilization will be dead, a victim of the microcomputer, long before any of these other influences will have a chance at it. Some of these events, indeed, may happen, but if so

they will happen as *consequences* of the demise of Western civilization, rather than as causes.

What, then, is it about the microcomputer that will bring about the end of Western civilization? Which essential thread will it break? How can we best characterize this phenomenon?

These questions are most conveniently answered in the reverse order. The phenomenon can be characterized in a single word: isolation. The essential thread is face-to-face communication. Western civilization cannot survive without it.

A person, in order to retain his humanity, must remain in face to face communication with other people. All masks and intermediaries distort the message and dehumanize the person.

The automobile provides an admirable example of this effect. People who are polite and courteous in person, and who remain so to their passengers, frequently become aggressive and impatient as drivers. The walls of the automobile serve to divide the universe into two portions: the smaller one — within — where friends may be found, and the great outside which is peopled by enemies, antagonists, fools and incompetents.

Recent technology as a whole, in fact, appears to possess a definite bias toward increasing the isolation of individuals.

Television is more isolating than either radio or the movies. Radio drama, by forcing the listener to apply his own resources to flesh out, in his mind's eye, the bare sounds, somehow managed to create an identity and feeling of kinship which has escaped television. Television, by contrast, feeds the viewer so much information that use of his own imagination is strongly impeded, if not entirely prevented. And while the movies flood the viewer with as much information as television, at least they involve him in the pseudo-social exercise of leaving his den and mingling with other people, with some of whom he may have actual face-to-face conversation.

'Walking' Earphone

A more recent phenomenon is the "walking" earphone. Conrad Aiken wrote a very poignant short story of a child falling into the isolation of schizophrenia as his "Silent Snow, Secret Snow" cut him off from the rest of the world. Walking earphones are little less than a voluntary dive into a far from silent, but quite secret, snowbank.

Before looking specifically at the microcomputer, let us consider the role of computers and computerniks in general in the increasing isolation of humans. The first point to note is that people who work with computers generally prefer computers to people. Their failures at communicating with real people in the design and construction of their systems are legion and legendary. It is therefore not surprising to see them push Hermes as a substitute for person-to-person or even telephone-to-telephone conversation, or to push Planet or Delphi as a substitute for face-to-face conferences.

Delphi in particular has an impressive weight of authority behind it, but to work it must be tightly controlled: so tightly controlled in fact as to be extremely manipulable.

On the other hand, the absence of such control can lead to the following sort of teleconference experience: A teleconference was established to coordinate a number of people whose offices were in the same or adjoining buildings. A simple misunderstanding arose concerning the vocal distribution of information which was not then entered into the conference. The result was an edict that no information could be considered valid if it did not appear in the teleconference. This did not quite require an insertion of Peano's axioms so that we could discuss arithmetic, but nearly so. What *did* develop was the Interactive Pie-Throwing Conference, a juvenile exercise in vituperation and graffitic one-upmanship.

The second point, of course, is the astonishing number and variety of ways in which machines in general, and computer-controlled machines in particular, already come between two people engaged in transactions which in simpler times would have been person-to-person. Vending and change machines are obvious examples. Another is the telephone, which was bad enough when it merely stood between two people, but which now may hide

(Continued on In Depth/10)

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IN DEPTH

(Continued from In Depth/9)

another machine — a tape recorder or a speech synthesizer — at the other end. One can turn to the computer for "companionship" in the form of participation in such human games as chess, bridge and poker. Even procreation is not immune to the intervention of the machine.

And so we finally come to the question of the specific role of the microcomputer: How is this little device going to exploit the present tendency towards isolation to bring about the demise of Western civilization? In brief, by bringing total isolation within the reach of anyone who wants it.

We are surrounded by ample evidence of how this will come about. Essentially any profession — except the world's oldest — could be followed in complete isolation. It is already common to do all of one's shopping by telephone and mail; the microcomputer will make it possible to extend that to the remote ordering — and even fitting — of *tailor-made* clothes.

Computers are already assisting in medical diagnoses. It will not be long before microcomputers will be able to monitor all one's vital signs 100% of the time with 99% accuracy, not to mention the automatic specimen analyzer that will be built into the toilet of the future.

And speaking of analysis, it will no longer be necessary to leave one's womb, even for psychoanalysis.

It is not necessary to elaborate. The microcomputer will enable one to live his entire life without face-to-face contact with another human being.

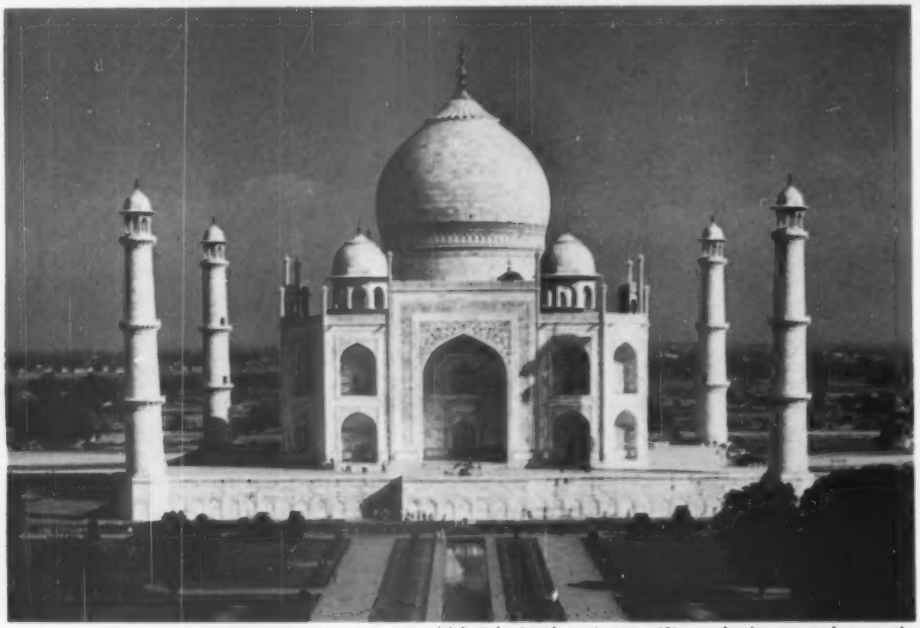
But just because complete isolation is possible, why would anyone — or more particularly, everyone — want it? Because it is there, for starters. Because someone else has it. Because the machine is efficient as a way of delivering individualized services.

But most important, because it is safe. To meet people face to face is to risk involvement, and involvement is certain to result in pain. Most people will willingly eschew the possible joys of direct contact in order to escape the certain pain. And as face-to-face meetings become more rare, people will forget how to conduct them, the pain will become sharper and more certain and the withdrawals more prolonged.

As might be expected, the computer folk will lead the way. The home terminal is the first step of the great shift away from the office and into the home. As computer-powered toys become ever more seductive there will be ever less reason for unfiltered interpersonal communication.

Writing in the *San Francisco Chronicle*, Charles McCabe has characterized the influence of television as a "new loneliness [which] is an inhuman condition, a deliberate removal of self from the concerns which have always moved human beings. Worse, it is an abdication of self."

This abdication of self is a technologically induced change that Western civilization cannot withstand. The result may be chaos or another civilization (I think the latter). It may be better or worse than Western civilization (right now, I'd put my money on worse), but it will not be Western civilization.



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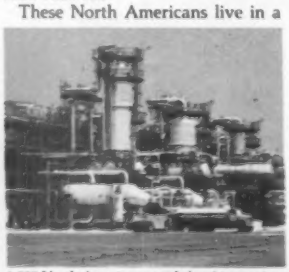

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David F. Stevens is head of the computer center at Lawrence Berkeley Laboratory, Berkeley, Calif.

He has published widely in the trade press; this is his second article in Computerworld, *an effort supported by a contract with the U.S. Department of Energy.*

Stevens holds a B.A. degree from the California Institute of Technology and an M.A. from the University of California, both in mathematics.

The Codec Connection

BY THEODORE VAECHES

Telecommunications systems of the future will use millions of integrated circuits in PBXs, channel banks and transmission systems. The most important linear IC telecommunications developments have involved coder/-decoders, better known as codecs. Codecs perform the complicated task of translating the analog voice signal into an appropriate pulse-code modulation (PCM)-formatted digital code for transmission across data highways and, at the receiving end, restoring the voice signal from the transmitted digital data.

To better appreciate the codec function, it is helpful to examine the structure and organization of the telecommunications network and the concepts involved in converting analog data into PCM-formatted digital code.

In the Beginning

In 1876, Alexander Graham Bell patented the first workable telephone and demonstrated it at the Centennial Exposition in Philadelphia. Two years later in New Haven, Conn., the first telephone network was installed, interconnecting 21 subscribers through a central switchboard or switching center. In the years that followed, many other networks were installed, with an ever-increasing number of subscribers requiring service.

Early telephone systems had manual switchboards to interconnect subscribers, and transmission was limited to one conversation per transmission path. As the number of subscribers increased, switching centers became more complicated and more transmission paths were required for efficient operation.

It soon became apparent that more sophisticated switching and transmission techniques were needed to provide telecommunications services economically. A switching hierarchy was developed to effectively utilize switching offices and transmission paths; multiplexing techniques were devised to enable simultaneous data transfer over a single transmission path.

Switching Hierarchy

The basic function of the telecommunications switching network is to provide an interconnection between any two subscribers on the network via transmission paths and switching centers. In switching network design, there is a trade-off between the number of transmission paths and the number of switching centers; if fewer switching centers are used, more transmission paths are required.

The network should be structured to minimize overall cost and to provide a service with a low probability of failing to establish a connection. Also, alternative routing must be available for routing calls to their destinations when some part of the primary transmission path is busy or damaged. This capacity extends the versatility of the network but introduces switching complexities.

The switching scheme selected to avoid unnecessary complications consists of a hierarchy of switching offices in a successive star-type configuration.

There are three types of switching offices in the hierarchy — local central offices (also referred to as end offices), tandem offices and toll offices (see Figure 1).

Local central offices provide the first level of switching and connect subscribers to the telecommunications network. All subscribers within a given area are connected via local loops — individual transmission paths — to a single local central office. Subscribers within the same area may be interconnected directly through the local central office.

Subscribers within the same city but in different areas may be interconnected by a second level of switching that establishes transmission links between local central offices. These transmission links, called trunks, are made up of many multiplexed transmission paths for simultaneously handling multiple conversations.

A large city may have so many local central offices that it is not economical to have trunks connecting all of them. In that case, the local central offices are interconnected via a tandem office.

To connect subscribers from different cities, calls are routed through toll offices. There are four levels of toll offices in the switching-center hierarchy — toll centers, primary centers, sectional centers and regional centers (see Figure 2). Toll offices are connected by intertoll trunks that provide high-capacity transmission links.

In general, switching priorities are established so that the subscriber will experience minimal delay in completing a connection. The path chosen at each switching level minimizes subsequent switching, using additional switching levels only when a primary transmission path is blocked.

Multiplexing for Economy

One way to reduce the possibility of a blocked transmission path is to extend its signal-handling capability by multiplexing the transmitted data.

There are two methods for multiplexing signals (see Figure 3) — frequency-division multiplexing (FDM) and time-division multiplexing (TDM). Data to be transferred can be thought of as occupying a two-dimensional continuum of frequency and time. The quantity of information that can be carried is proportional to the time period and to the frequency range (bandwidth). If the quantity of information to or from a single subscriber is less than the physical facilities can carry, the available space can be divided into either frequency slots (for FDM) or time slots (for TDM), so that information from several subscribers may be transmitted over the same physical path.

The first multiplexing technique used in telecommunications networks was FDM, an analog transmission technique. Data from several subscribers is used to modulate carrier frequencies separated from each other by a given bandwidth (guard band). These modulated carriers are all amplified and

(Continued on In Depth/14)

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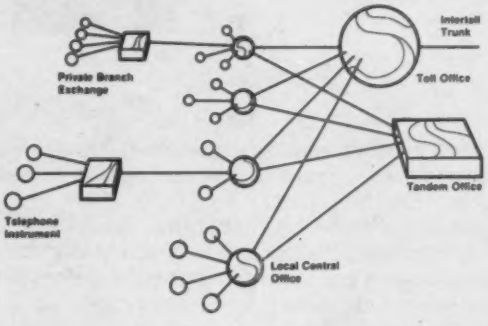

Figure 1. Types of Telephone Exchanges (Switching Centers)

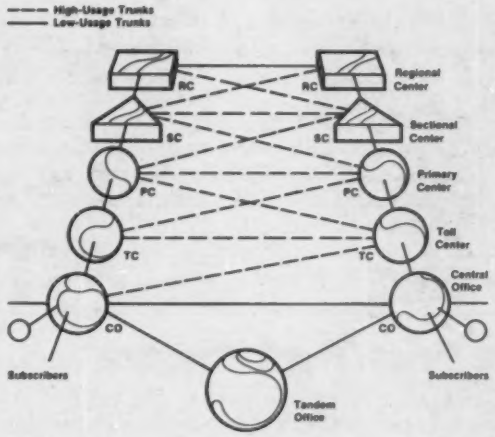

Figure 2. Hierarchy of Switching Centers in Bell System

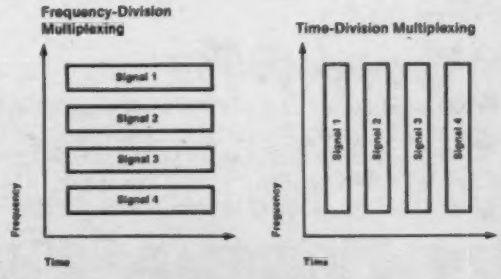

Figure 3. Methods of Multiplexing

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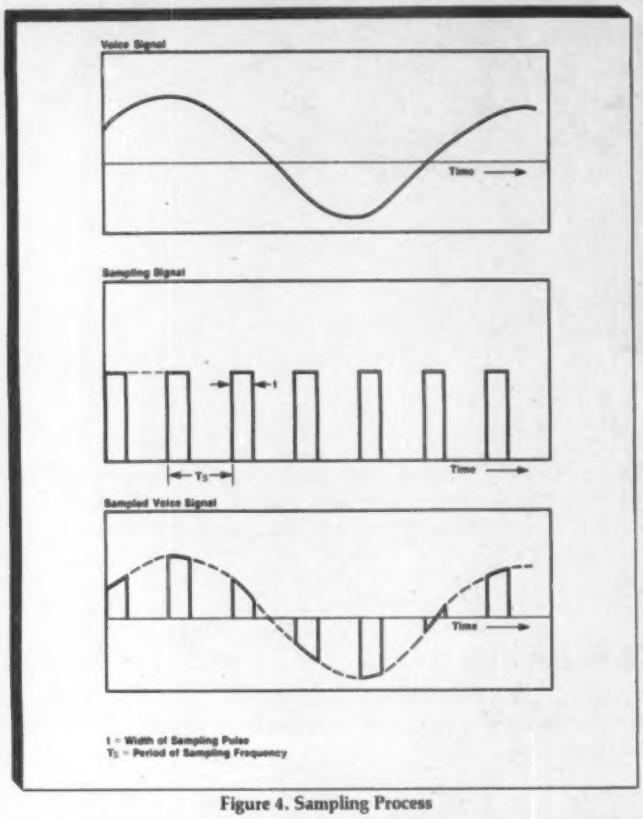

Figure 4. Sampling Process

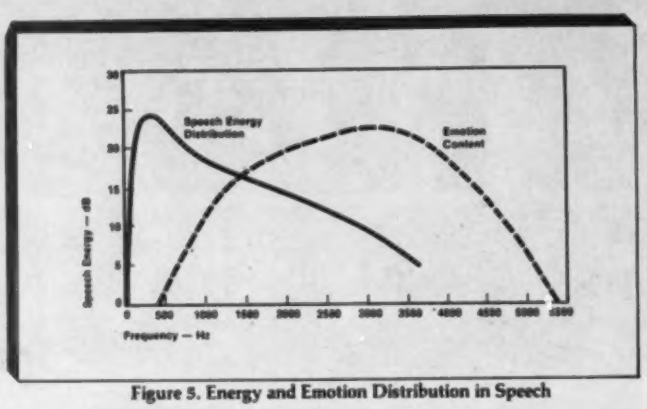

Figure 5. Energy and Emotion Distribution in Speech

(Continued from In Depth/11)
transmitted together over a single data path, then demultiplexed at the receiving end.

Today about 60% of the trunk lines in the U.S. employ FDM. Implementing FDM requires filters of exact prescribed characteristics and highly linear amplifiers. In addition, transmission over long distances is difficult because of noise, crosstalk and other distortion that accumulates over the transmission path.

In the alternative method — TDM — digital signals are interleaved over a basic time period called a frame. Each signal is assigned a time slot within the frame in which to transfer information. The process is repeated in each frame so that the physical transmission path is shared among a number of signals.

TDM has many performance advantages over FDM. Digital switching networks are easier to maintain than analog, have fewer components for higher reliability, require less space and are easier to install. In addition, digital information is easily regenerated, eliminating the effects of noise, crosstalk and other distortion. Another advantage is versatility since information from a variety of sources can be more easily multiplexed and switched in digital form.

PCM Processing

To interleave voice signals with TDM, the voice (analog) signal is first converted into digital form using the PCM technique.

The basic principle underlying this technique is the sampling theorem: If a band-limited signal is sampled at regular intervals of time and at a rate equal to or higher than twice the highest significant signal frequency, then the sample contains all the information of the original signal, which may then be reconstructed by the use of a low-pass filter.

Once the band-limited analog signal has been sampled (Figure 4), the samples are quantized into a finite number of discrete levels and each level is assigned a digital code that represents the quantized sample. The digital code can then be transmitted in place of the analog signal and decoded at the receiving end to reconstruct the original signal. Thus, the basic processes of the PCM system are sampling, quantization and coding.

Understanding the sampling process requires a basic knowledge of the speech signal. Although the voice frequency range extends from about 100 to 8,000 Hz, the major speech intelligence and energy contents fall within a bandwidth of from 200 to 3,400 Hz (Figure 5). Therefore, if a voice signal is band-limited, using filtering techniques, to a frequency of 3,400 Hz, little information content is lost and satisfactory signal fidelity can be maintained.

Better Use of Paths

Application of the sampling theorem shows how band-limiting can result in more effective use of the transmission paths. Without band-limiting, the voice signal must be sampled at a rate of at least 16 kHz to avoid distortion (aliasing). That is, 16,000 samples must be transmitted each second for each voice signal multiplexed. Band-limiting to 3.4 kHz with a guard band that extends to 4 kHz lowers the required sampling rate to 8 kHz. Since only half as many samples must be transmitted for the band-limited signal, twice as many signals can be multiplexed.

The amplitude level of a sampled voice signal may be any one of an infinite number of levels. If every one of these levels were represented by a code, the code would be infinite in length, and transmitting information economically would be impossible. For this reason, the sample is quantized before coding. In quantization, the sample amplitudes are limited to a finite number of discrete levels.

When a signal is sampled, the nearest discrete level is used in place of the true signal level. Each of the finite number of discrete levels is then assigned a code, the length of which is proportional to the number of discrete levels in the quantization process (Figure 6).

In determining the number of discrete levels, there are two conflicting requirements — signal fidelity and transmission bandwidth. Signal fidelity reflects the ability of the system to reconstruct the original signal from the quantized signal.

Decreasing the distance between discrete levels in the quantization process improves accuracy in reproducing the

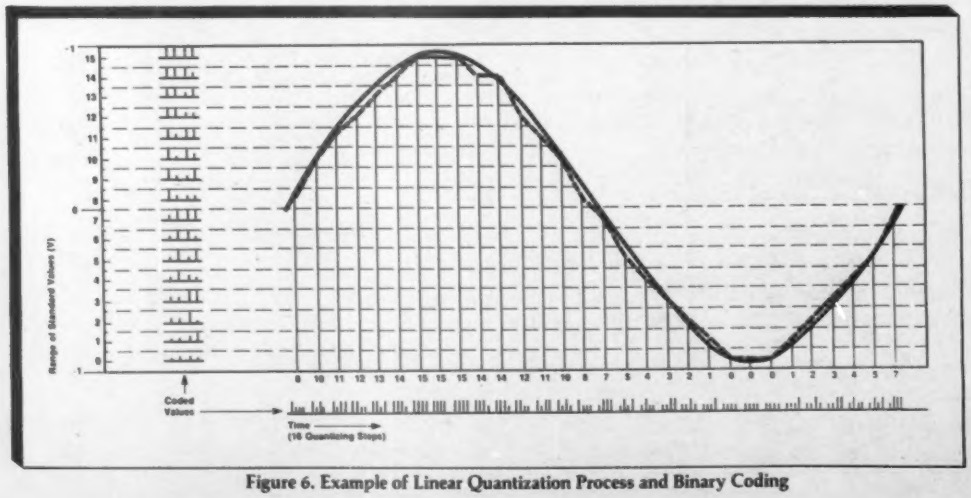

Figure 6. Example of Linear Quantization Process and Binary Coding

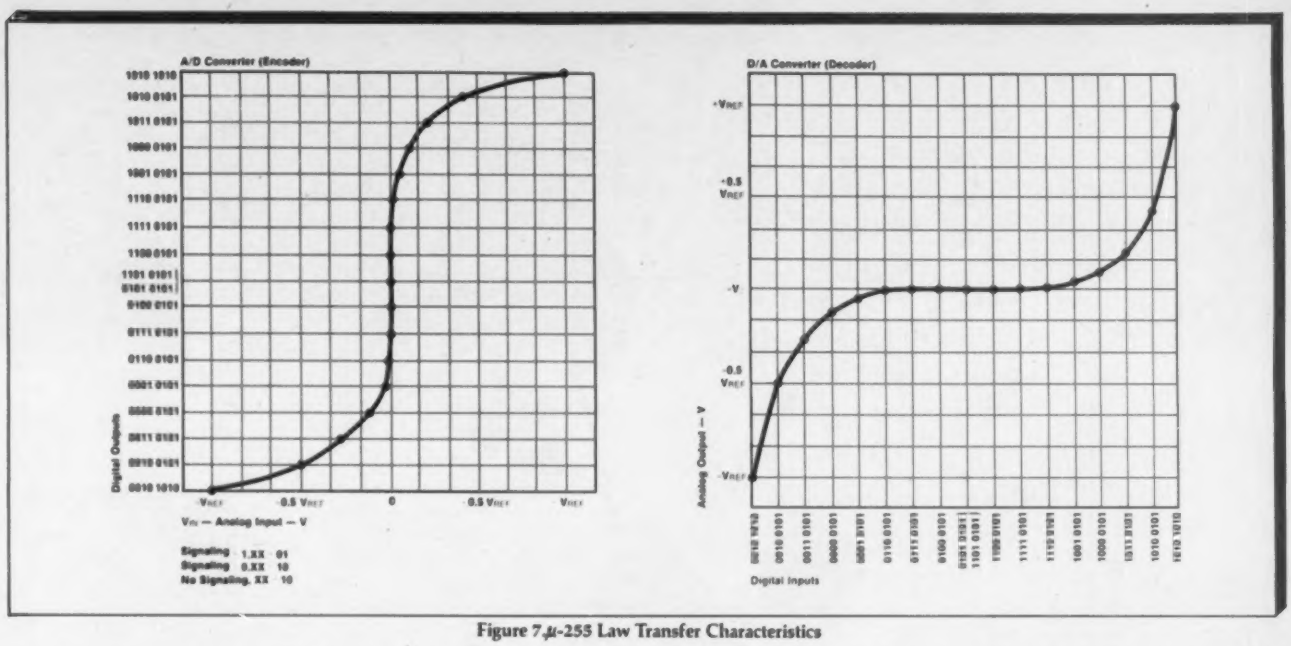

Figure 7.μ-255 Law Transfer Characteristics

original signal by reducing the maximum difference between the true signal and the sel :ted level. However, this increases ẗ . number of discrete levels and thus increases the code length. As the length of the code increases, the bandwidth required to transmit the sigr al also increases, reducing multiplexing capacity.

When linear quantization techniques are applied with constant steps between discrete levels, samples with 13-bit representations (12 bits plus a sign bit) are required for adequate fidelity. Thiis is actually the low-signal-level requirement, since at larger signal levels, adequate fidelity can be maintained with less resolution. Based on this consideration, nonlinear *companding* quantization techniques were developed to reduce the number of bits in the code representing the samples.

Companding

Companding techniques maintain a relatively constant signal-to-distortion ratio (fidelity) over the wide range of levels required by the speech signal by using small step sizes at low signal levels (high resolution) and progressively larger steps at larger signal levels (lower resolution). With companding techniques, acceptable fidelity levels can be obtained with only eight coding bits.

At the present time, two companding algorithms are in wide use — the Bell system μ -255 Law in North America and the CCITT A-87.6 Law in much of the rest of the world. The μ-Law and A-Law differ in transfer characteristics associated with the analog/digital (a/d) and digital/analog (d/a) conversions (Figures 7 and 8). These transfer characteristics are approximated by codecs through a piecewise linear technique.

In each case, the 8-bit code is divided into a sign bit, three chord or segment bits, and four bits for step selection with a given segment. Within each segment, quantization is linear and step sizes are uniform. However, moving away from the origin, the step sizes double for each successive noncolinear segment (Figure 9).

In the μ -255 Law, the first segments on each side of the origin are colinear and have the same step size (Figure 10). Also, the μ -Law has a midstep condition or dead zone around the origin so that for an idle channel the digital code will reflect a zero level, as long as the noise level is less than the step

(Continued on In Depth/18)

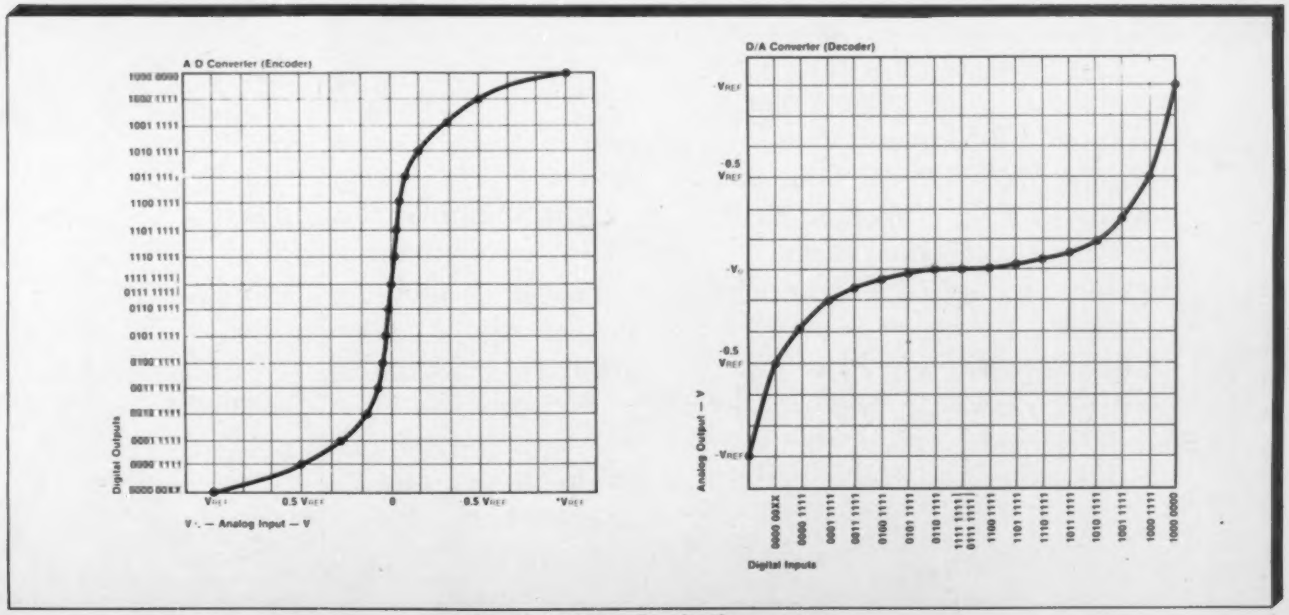

Figure 8. A-87.6 Law Transfer Characteristics

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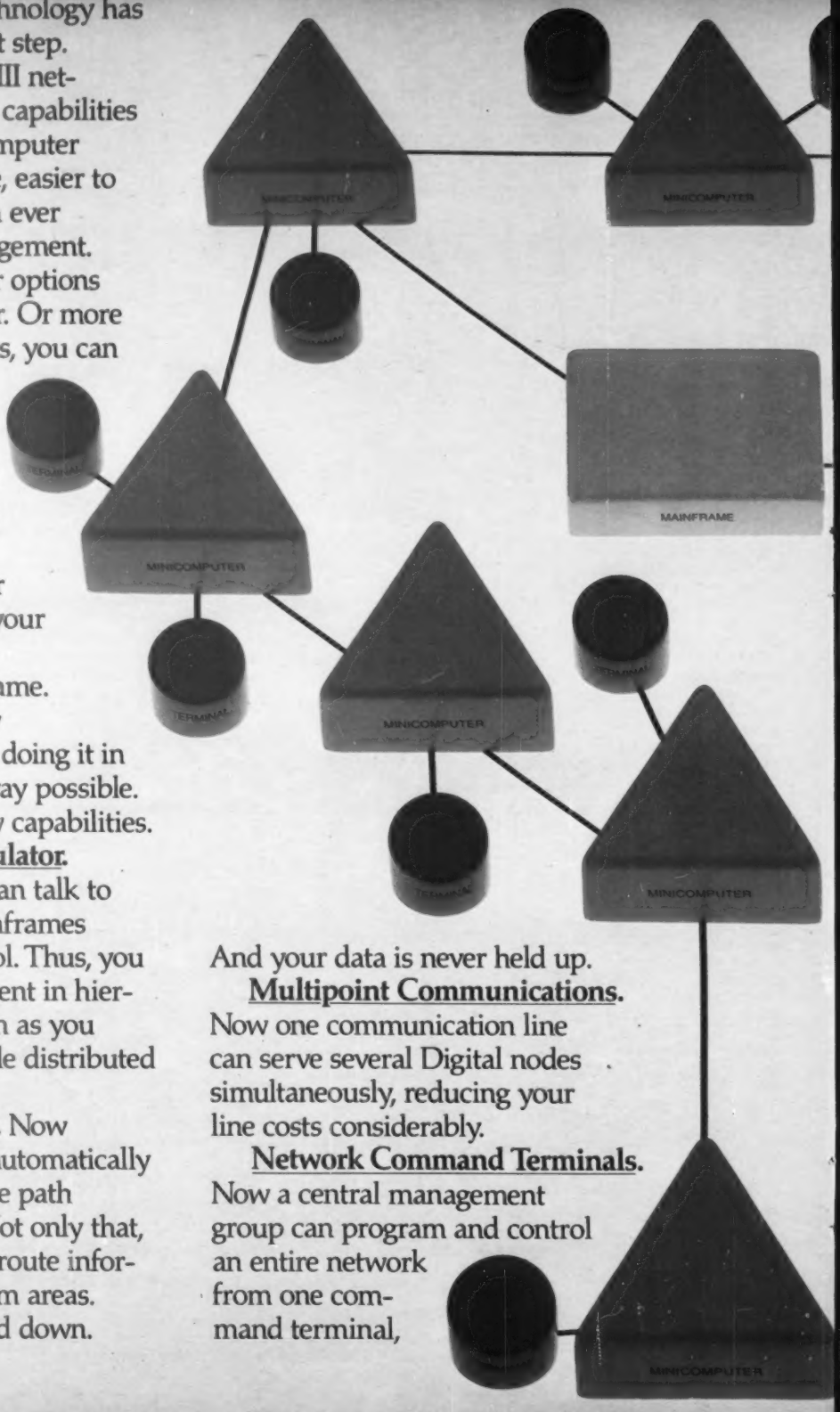

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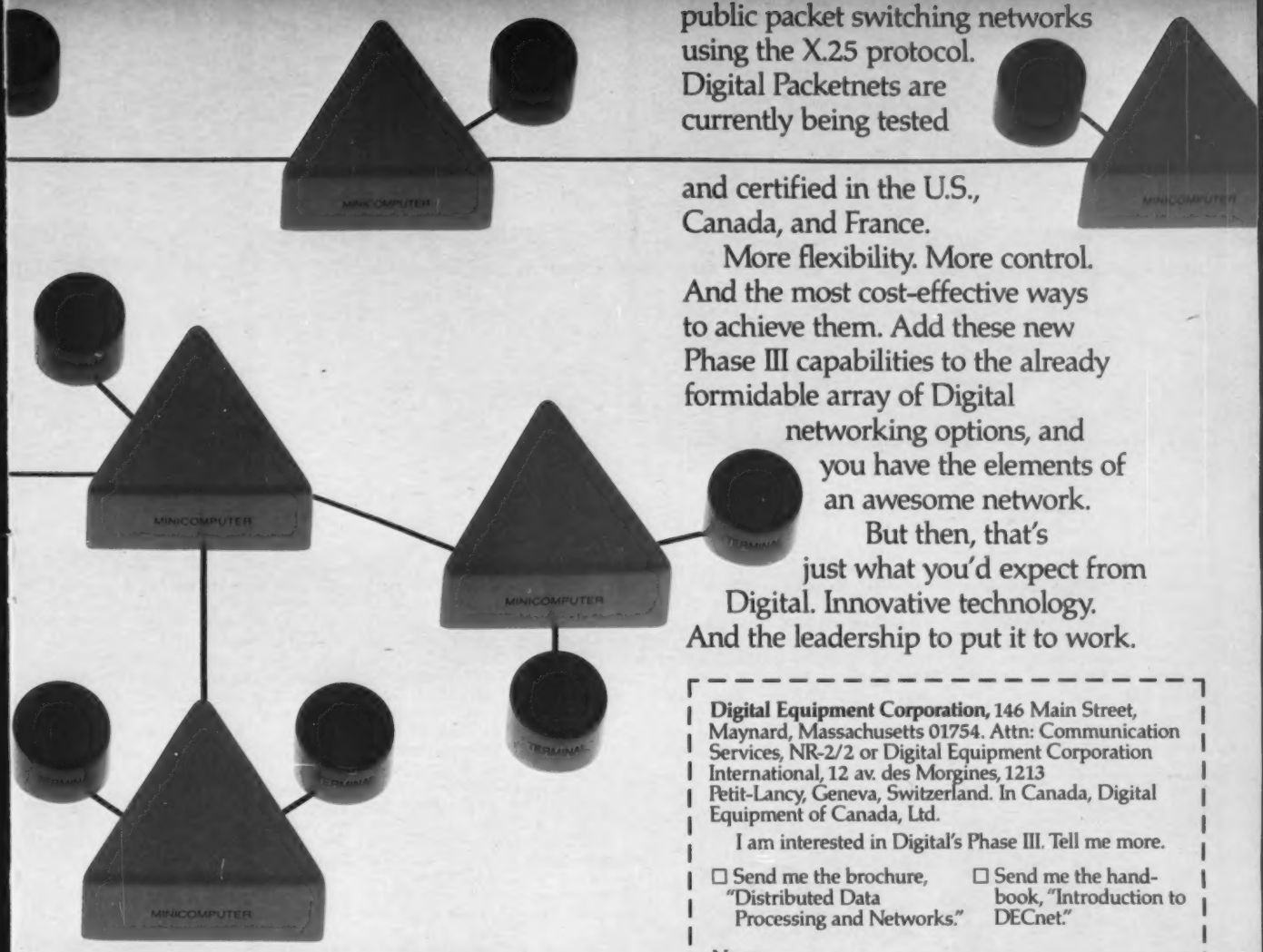

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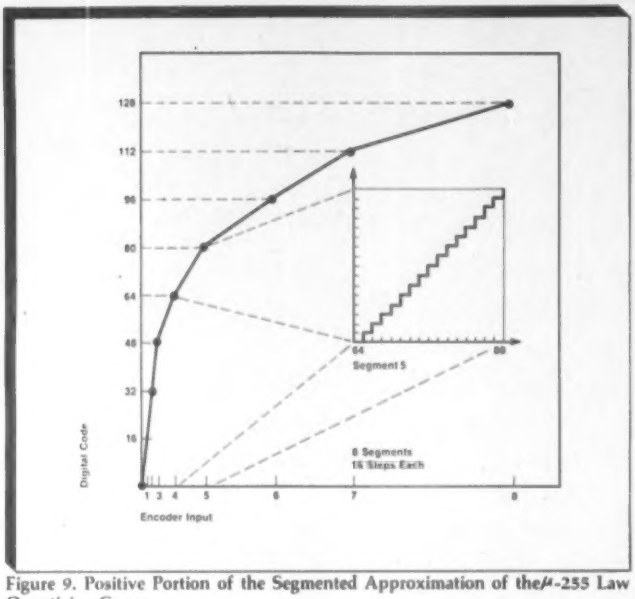

Figure 9. Positive Portion of the Segmented Approximation of the μ-255 Law Quantizing Curve.

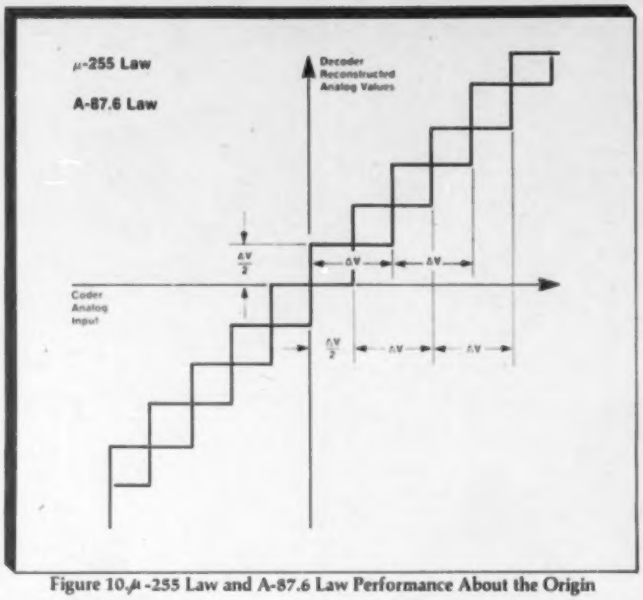

Figure 10. μ-255 Law and A-87.6 Law Performance About the Origin

(Continued from In Depth/15)

size of the first segment (613 μ V).

In the A-Law, the two segments on each side of the origin are colinear and have the same step size. The A-Law has a mid-riser condition at the origin; for an idle channel, the digital code will reflect a zero level, as long as the noise level is less than half the step size of the first segment. Since the initial step size for the A-Law is twice that of the μ -Law, noise performance about the origin is equivalent.

Comparing both laws shows that low-level resolution of the μ -Law corresponds to 13 bits of linear coding, while low-level resolution of the A-Law is equivalent to only 11 bits. Dynamic range is 78 db for the μ -Law and 66 db for the A-Law, and the range over which the signal-to-distortion ratio stays nearly constant is 40 db for the μ -Law and 35 db for the A-Law.

To summarize PCM processing, the voice signal is first limited to 4 kHz, then sampled at an 8 kHz rate. Each sample is then quantized using a companding technique to form an 8-bit code representation for each sample. Therefore, for each multiplexed signal, there are 8,000 8-bit codes sent each second.

Formatting Techniques

Multiplexing a number of signals into a serial data stream requires a method of synchronizing the encoding and decoding operations so that each signal reaches the proper destination and is properly decoded. In North America, the Bell D3/T1 carrier system, which incorporates the μ -255 Law, uses a frame format where each frame consists of 24 channels (time slots) (see Figure 11). During each time slot, the 8-bit digital code corresponding to the signal assigned to that slot is transmitted. Thus, 24 signals per frame can be multiplexed.

In addition, a single framing bit is inserted at the end of the 24 channels, making a total of 193 bit/frame. Eight thousand frames are transmitted each second for a total data rate of 1.544M bit/sec.

The Bell carrier system also permits the insertion of signaling data into the bit stream so that information such as alarm, off-hook and on-hook conditions and so forth can be communicated between the transmit and receive points. Under the μ -255 Law, every sixth frame is a signaling frame, in which the eighth bit (LSB) of each channel is discarded and signaling data inserted in its place.

Systems outside North America use the CCITT recommended format (Figure 12), in conjunction with the A-Law. In this format, each frame consists of 32 channels — 30 to multiplex voice signals, one entire time slot for framing and the final channel for signaling data.

The 5151 Codec

The 5151 monolithic CMOS codec conforms to the North American standard μ -255 companding law and can encode and decode data in the format required by the Bell D3/T1 carrier system. It is intended for use in the telecommunications industry as a per-channel voice-frequency codec in D3 channel banks and PBX systems.

The 5151 codec can be partitioned into three sections: encode, decode and control (Figure 13). The encode section

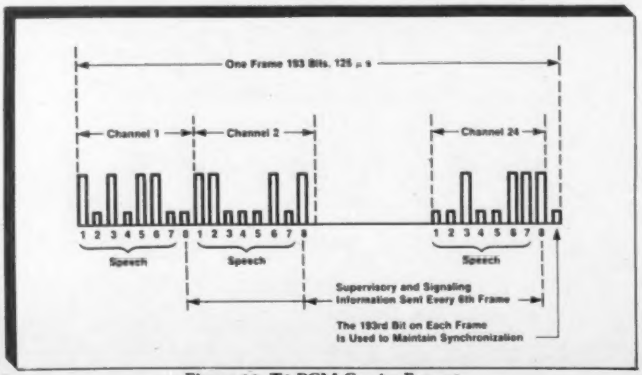
One Frame 193 Bits, 125 μ s
Channel 1
Channel 2
Channel 24
1 2 3 4 5 6 7 8
Speech
Speech
Speech
Supervisory and Signaling Information Sent Every 6th Frame
The 193rd Bit on Each Frame Is Used to Maintain Synchronization

Figure 11. T1 PCM Carrier Format

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performs a/d conversion by the successive-approximation technique. It includes a linear 13-bit d/a converter, successive-approximation register (SAR) and comparator. An auto-zero mechanism, used to eliminate the effects of the comparator input offset voltage, and a sample-and-hold circuit are integrated within the comparator.

A 13-bit latch and an 8-bit shift register provide temporary storage for digital information during the conversion process and subsequent output operation. Logic is also provided for inserting A/B signaling information into the word formed during conversion.

The decode section performs the complementary d/a conversion and contains a 13-bit d/a converter, 13-bit latch, 8-bit shift register, unity-gain amplifier that serves as an output buffer and the logic required to remove the A/B signaling from the incoming 8-bit PCM-formatted code.

Control Section

The control section provides the timing for encoding and decoding and determines whether the encode or decode section will be connected to the 8-bit to 13-bit translator used in both operations. This control section includes the master sequence controller, encode and decode control logic and the 8-bit (companded) to 13-bit (linear) translator.

For increased system flexibility and greater isolation between encoding and decoding functions, the 5151 codec contains two independent 13-bit linear d/a converters. The function of each converter is to generate an analog voltage corresponding to the digital input code.

This voltage is generated by a capacitive voltage-divider network using the principle of charge redistribution to select a fraction of a positive or negative reference. With this technique, fractional voltage levels are determined solely by the relative sizes of the capacitors selected in the divider network. Since the auto-zero-filtering and sample-and-hold capacitors are incorporated into the network, no external capacitors are needed.

Operation

During the encode operation, the analog signal is first sampled by the comparator. The sample period begins at the first positive transition of the master clock following the rising edge of the XMIT SYNC pulse and lasts for approximately 32 master clock periods. During the sampling period, the SAR is cleared and the auto-zero sequence initiated. The sample-and-hold circuit then switches to the hold mode and the SAR is enabled, starting the successive-approximation routine which lasts approximately 80μs.

The 8-bit word formed in the SAR serves as the input to the 8-bit to 13-bit translator. The translator output programs the 13-bit d/a converter input, and the converter output is fed into the comparator. The comparator

(Continued on In Depth/20)

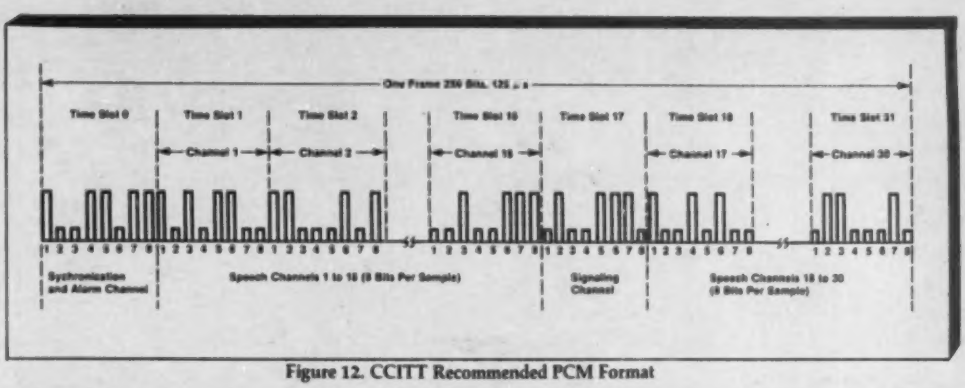

Figure 12. CCITT Recommended PCM Format

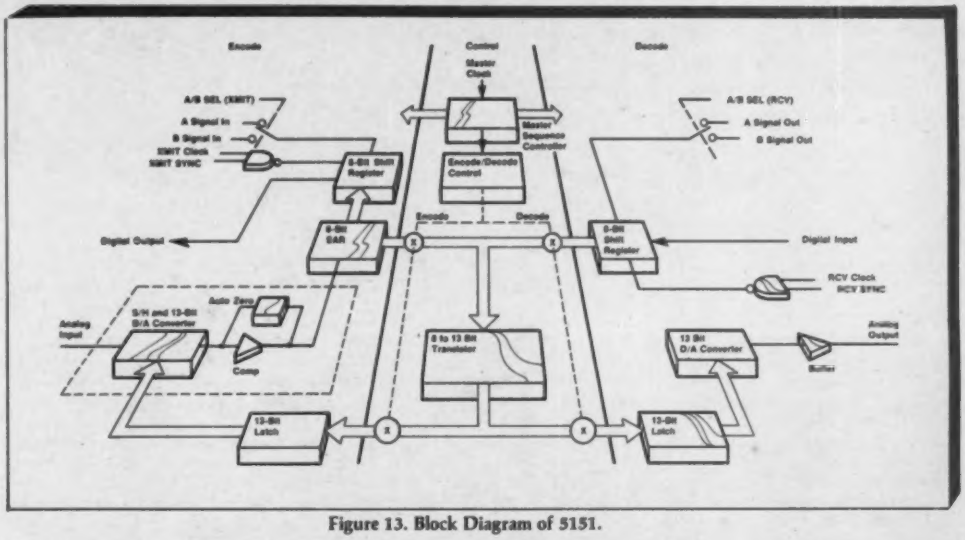

Figure 13. Block Diagram of 5151.

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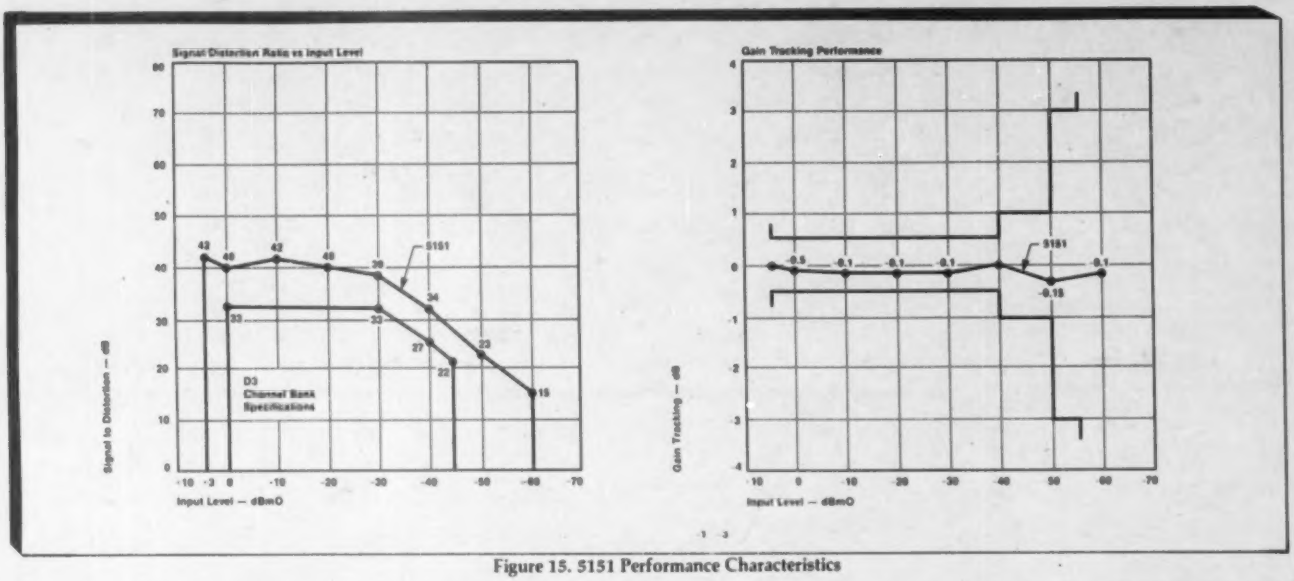

Figure 15. 5151 Performance Characteristics

(Continued from In Depth/19)
output level then determines the value of the bit currently being generated in the SAR. The successive-approximation routine continues until all eight bits have been generated.

At the end of the a/d conversion, the 8-bit companded word generated in the SAR is transferred to the 8-bit shift register, which operates as an output register. When XMIT SYNC is LOW, this register has a three-state high-impedance output allowing the outputs of several codecs to be wired-OR for time-division multiplexing. When the XMIT SYNC is HIGH, the 8-bit word is shifted out on positive transitions of the XMIT clock.

In addition to the basic encoding process in the 5151, A/B signaling information can be inserted into every sixth 8-bit encoded word. A positive transition on the A/B SEL XMIT signal routes the A-Signal input, or a negative transition routes the B-Signal input, into the LSB of the 8-bit word.

During the decode operation, data is shifted serially into an 8-bit shift register, sign bit (MSB) first. Shifting occurs when RCV SYNC is HIGH, on positive transitions of the RCV clock. On the falling edge of RCV SYNC, the encode/decode control logic switches the output of the shift register into the 8-bit to 13-bit translator. At the same time, a signal is sent to the master sequence controller to inhibit the SAR clock used in the control of encode operation.

After six master clock periods, the time required to propagate through the translator, the 13-bit linear code is strobed into the 13-bit latch and encode operation can continue. The output of the 13-bit latch programs the d/a converter. The d/a converter output is buffered by a unity-gain amplifier and externally filtered to reconstruct the original analog input signal.

(Continued on In Depth/22)

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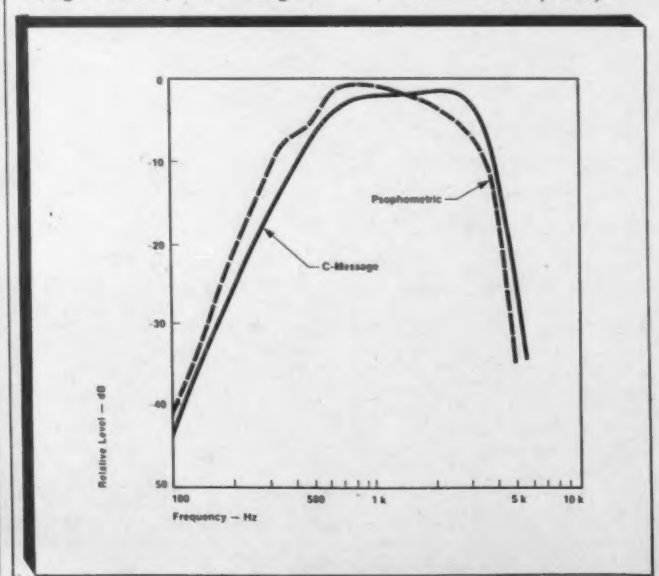

Figure 14. Frequency Response of Weighting Networks

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IN DEPTH

(Continued from In Depth/20)

Every sixth frame, A/B signaling data may be removed from the incoming 8-bit word. During a positive transition of the A/B SEL RCV, the LSB of the 8-bit code is transferred to the A-Signal output; during a negative transition, the LSB is transferred to the B-Signal output.

Codec Performance

The three main specifications for evaluating codec performance are idle channel noise, gain tracking and signal-to-distortion ratio. Idle channel noise is the noise seen at the analog output when no signal is being transmitted. The unit of measurement in North America is dbrnCo, the relative noise level in decibels when measured through a C-message weighted filter. This filter simulates the nonlinear response of the human ear and telephone subset to specific frequencies to allow for the relative effects of noise interference.

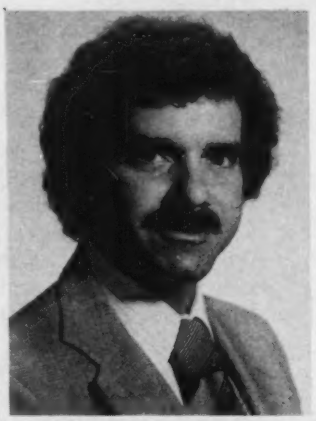
Outside North America, the (CCITT) psophometric weighted filter is used and idle channel noise is measured in units of dbmOp — relative noise level in decibels when measured through a psophometric weighted filter (Figure 14).

Gain tracking, specified in db, measures how well the output of the codec linearly tracks the input level. Because of the nonlinear quantization, this specification is given over input power ranges. Signal-to-distortion ratio, also measured in db, is the ratio of the signal power to the distortion power created by quantization errors and internal noise. Signal-to-distortion ratio is also given over input power ranges because of the nonlinear quantization technique (Figure 15).

The 5151 codec exceeds the D3 channel-bank transmission specifications for the above characteristics. In addition, CMOS technology results in extremely low power dissipation, typically 30 mW, an important consideration in telecommunications.

For reasons of economy and efficiency, it has become necessary to organize the telecommunications network as a switching hierarchy and use multiplexing techniques to permit simultaneous transmission of signals over each transmission path. Multiplexing techniques were traditionally analog, but since the mid-1960s, digital techniques have become an alternative. In digital multiplexing, the voice signal is converted into digital form through pulse-code modulation, utilizing a companding quantization algorithm. After transmission, the digital data stream is then demultiplexed and a complementary process converts the digital code back into the original analog voice form.

The process of converting the analog data into PCM-formatted digital words and the complementary process of converting these words back into analog data is the function of the codec. The 5151 codec performs this function in conformance with the μ-255 Law and, in addition, provides the logic necessary to encode and decode A/B signaling data required by the D3/T1 carrier system.



Theodore Vaeches is manager of linear applications at Fairchild Camera and Instrument Corp. in Mountain View, Calif.

Vaeches joined Fairchild in 1977 from Signetics Corp., where he was an applications engineer for three years. Prior to that, he was a field engineer at Univac and Four-Phase Systems, Inc.

Vaeches received a B.S.E.E. degree from City College of New York in 1972 and an M.S.E.E. degree from San Jose State University in 1975.

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GTE Head Sees Private Lines Outpriced by '83

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Leased private-line service will become uneconomical within the U.S. by 1983. A year or so later, the same thing will happen internationally, Dr. Lawrence J. Roberts, president of GTE Telenet Communications Corp., predicted here recently.

According to Roberts, a pioneer developer of packet-switched communications technology, in both cases, the growth of broadband digital transmission facilities — coaxial cable, optical fiber, microwave and satellites — plus widespread availability of public data networks utilizing X.25 and other standard interfaces, will underprice leased services.

He explained that as broadband facilities proliferate, more users will be able to integrate their data, voice and record traffic into a single-bit stream, reducing the cost per transmitted bit below what they are now paying for separate facilities. Use of microwave and cable local distribution facilities, integrated voice and data controllers at the user's site and Ethernet-type cable busses within offices to tie multiple terminals together will extend the benefits of broadband end-to end, Roberts added.

He expects that by 1982, circuits operating at 1.544 M-bytes/sec will interconnect most U.S. cities. At that time, he said, the prices of broadband transmission facilities and fully loaded leased private lines will be competitive.

Meanwhile, increased use of bradband for international communication will drop those rates "by a factor of four during the next three years."

Telecommunications Conference

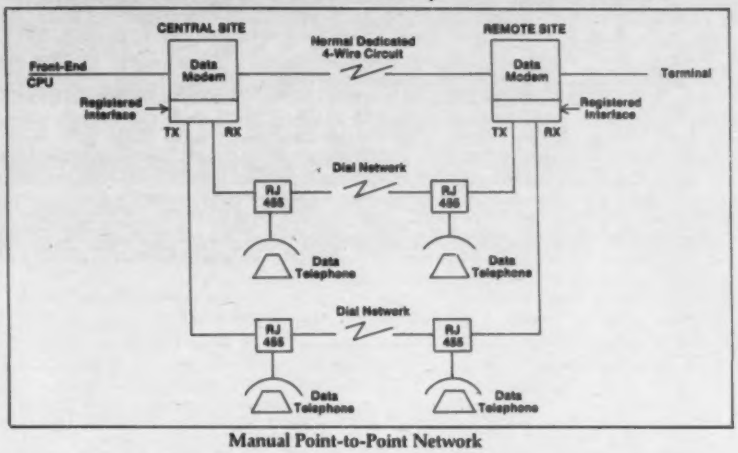
Roberts was one of several speakers who appeared at a conference on international telecommunications convened by Telecom Systems Group, Inc. of Cedar Grove, N.J. His comments about the coming demise of leased private-line service were made during a discussion of the restrictions foreign telecommunications administrations (PTTs) impose on users. He contended that since private-line service is fading away, the restrictions are only a temporary problem.

Roberts also insisted the restrictions are not intended to protect foreign suppliers of computer-based services and systems

(Continued on Page 64)

Dial Backup — Part 1

Network Circuit Failure Asks Resources, Control



Manual Point-to-Point Network

By Barney L. Dewey
Special to CW

To accomplish data transfer when network circuits fail, the user must provide enough resources — lease circuits, in-house private lines and so on — and control, such as switches and routing, to ensure reliability at all times.

A circuit failure may cause substantial inconvenience and lost income to an organization. This article focuses on methods to restore service when a leased circuit fails.

The purpose of most commercial telecommunications systems is to continuously transfer data from one point to another in the most economical and speedy fashion available. Most conventional applications of high-speed data transfer between two geographically separated locations involve the use of modems connected to four-wire leased telephone circuits.

If we focus on a network as a group of resources and controls, there are several possible alternatives for a system design. One combination of resources and controls would be to add a second circuit and an audio patch or A/B switch.

This "hot standby" circuit approach is easy to implement and operate, but it is usually prohibitively expensive.

Another solution is to use the Direct Distance Dial (DDD) network — the telephone system. This solution may take a little longer to establish than the above approach during a failure. However, this is not significant when compared to the advantages.

Dial backup for both point-to-point and multipoint systems is inexpensive, practical and effective in substantially reducing leased circuit downtime, a senior applications engineer for Codex Corp. contends in this two-part series.

Often circuit quality of the DDD network is a concern. Actual experience shows that speeds up to 4,800 bit/sec are usually established on the first call attempted; 9,600 bit/sec backup can often be established on the first call.

Some distant locations may require additional attempts. An alternative to recalling is to "fallback" the speed of high speed modems to 7,200- or 4,800 bit/sec.

Cost Advantage

The major advantages of this DDD approach are the low cost and the automatic circuit rerouting built into the DDD network. If a major circuit failure occurs, the DDD network will route (control) around

(Continued on Page 64)

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Private Line Leasing Seen Uneconomical by '83

(Continued from Page 63)

against competition form the U.S. Rather, the PTTs need to earn extra revenue to finance new networks.

Also, he said, they are trying to make their international private-line customers migrate to those networks. The Japanese, for example, refuse to lease private lines to U.S.-based service bureaus unless the lines are terminated in this country at a single, specified computer, but they do not impose such restrictions on access to their new Venus public data network.

The way to cope with these restrictions, Roberts said, is to convince the PTTs that the demand for international data communications services is elastic — in other words, that there is more to gain than to lose by reducing rates, interconnecting with additional U.S. carriers and removing present service restrictions. He suggested that U.S. data communications users will have better luck if they employ this persuasive approach than if they continue to fight the restrictions.

Most of the other speakers, however, disagreed with Roberts.

Philip Onstad, manager of telecommunication services for Control Data Corp., pointed out that NTT, the Japanese domestic communications carrier, is a major supplier of time-shared online data processing services within that country. CDC offers competing services, but because of the restrictions it can not offer most of them to Japanese customers.

Underlying this problem — and most of the others confronting U.S. firms that must lease circuits abroad — is the lack of a coordinated, consistent government policy, Onstad said. Responsibility is fragmented among the State Department, Federal Communications Commission and various other agencies.

There is little consultation with users and even less willingness to act when users come to the government with specific documented complaints showing they have been unfairly treated by foreign carriers.

Onstad, who has been lobbying hard for changes, indicated that next year Congress will consider legislation proposing a major revision of this country's international telecommunications policy apparatus. Establishment of a central office for coordinating government and industry viewpoints and receiving and acting upon user complaints is one change that will be considered, he said. Unless such an office is created, "the U.S. will suffer because this is what other countries are doing," Onstad said.

Resources, Control Needed

(Continued from Page 63)

the failure area.

Even when a portion of a cable that directly feeds a location goes bad, the use of recalling can sometimes establish data transfer over good circuit pairs in the bad cable. The balance of this article will discuss in detail the implementation of dial backup systems.

There are four major types of dial backup systems. For point-to-point circuits there are manual or automatic-answer systems. Likewise, multipoint circuits can use manual or automatic-answer methods of dial circuit acquisition.

Point-to-point circuits are the easiest to back up. They require a simple interface to each modem to provide switching between the dedicated leased circuit and the dial (DDD) network.

Manual dial backup operation of a point-to-point circuit is shown in Figure 1. The following equipment is necessary at each location:

- A pair of data telephones with exclusion keys — set for telephone controlling the lines — with an RJ-455 modular telephone jack.
- A modem with a registered telephone interface and a leased/dial line switch;

To see how manual dial backup actually works, let's look at the following example.

The sample network in Figure 1 consists of a point-to-point 9,600 bit/sec circuit between a computer center on the West Coast and a city on the East Coast.

The leased circuit has failed. A person at the computer center calls another person at the remote site. The call is made from the appropriate data telephone at the computer site to the appropriate data telephone at the remote site.

After the first call is completed, a second call is made using the appropriate data telephones. When both calls are established with a person at the remote site, that person first pulls up the data telephone exclusion keys on both telephones and then pushes the "leased line/dial line" switch on the modem to "dial line."

In systems where there are many modems at the central site, it is desirable to configure the dial backup equipment at the central site so that it can be used by any of the modems. When common dial backup equipment is used, the system design at the remote locations remains unchanged.

At the central site, the analog side of the modems is routed through an audio patch bay. Then any modem can be patched into a Data Access Arrangement (DAA) and data telephone combination when dial backup is desired.

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The 2675 is also remarkably easy to operate. It uses friendly, English-like commands, and has a familiar, typewriter-style keyboard with eight soft keys you can define yourself. Once you've tailored the terminal to your application, those configurations come up automatically at every power-on, including automatic dialing and program calling. So even an inexperienced user can just pick up the terminal and go.

For fast, high-quality printing, the 2675's quiet thermal printer operates at up to 120 characters per second. And multiple print modes allow the printing of full-width computer reports on 8½" paper.

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What's more, the 2675's auto-answer and auto-dial features leave you free while the terminal's talking to the computer, and let you save by taking advantage of off-peak phone rates.

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Telex Introduces Printer For 275, 277 and 278 Units

TULSA, Okla. — A desktop message printer designed for Telex 275, 277 and 278 display stations has been introduced by Telex Computer Products.

Using the Telex 281, a terminal operator can obtain a hard-copy printout of information on the display screen with a single keystroke. The 281's partial print capability saves operator time by allowing users the choice of printing only designated information, a spokesman noted.

An optional feature, initiated by the host computer, allows the 281 to act as an electronic mailbox. By means of the printer, terminals throughout the country connected to the same host computer can send and receive information from one another.

The 281 prints up to three sheets of pressure-sensitive, carbon-lined or interleave paper.

Attached directly to Telex 275, 277 and 278, the portable bidirectional 281 matrix printer prints at 80 char./sec. An 80-column version prints at 10 char./in, while the 132-column version prints at 16.5 char./in. with 6- or 8 line/in. spacing.

The Telex 281

The 281 printer costs $1,500 from Telex Computer Products at 6422 E. 41st St., Tulsa, Okla. 74135.

Modem Runs In Two Environs

ANDOVER, Mass. — A limited-distance synchronous modem that operates in point-to-point and multipoint environments is available from Intertel, Inc.

The SLD 1920 reportedly provides data communications at speeds ranging form 2,400- to 19,200 bit/sec at distances up to 18 miles.

The stand-alone price is $895, while the rack-mounted version costs $725. Units can also be leased from the firm at 6 Shattuck Road, Andover, Mass. 01810.

'No-Frills' Version Of Micro8000 Out

CHATSWORTH, Calif. — Micom Systems, Inc. is offering a "no-frills" version of its Micro8000 modem that runs at 2,400 bit/sec.

The unit is suited to the minicomputer user and offers a four-channel data concentrator and automatic retransmission-on-error. It can be used by two to 16 asynchronous terminals, the vendor said.

The No-Frills Micro8000 modem will operate on minis from Data General Corp., Digital Equipment Corp, Hewlett-Packard Co. and other vendors. It costs $1,950.

Micom Systems also announced a high-performance option for its Micro800 data concentrator that is said to more than double throughput and to allow all channels of the concentrator to operate at 9,600 bit/sec.

The maximum composite high-speed output of the Micro800 is now increased from 9,600- to 19,200 bit/sec. The option can be used on dumb terminals that must be operated at 9,600 bit/sec, the vendor said.

The concentrator costs between $2,850 and $4,900, Micom said from 9551 Irondale Ave., Chatsworth, Calif. 91311.

Reports Cover SNA, 3270

SAN JOSE, Calif. — Two publications — "Introduction to SNA" and "The 3270 Product Line Report" — are available from Communications Solutions, Inc.

"Introduction to SNA" is said to take the reader step-by-step through all important aspects of SNA, including a description of SNA, its design objectives and scope and its history and evolution.

"The 3270 Product Line Report" traces the evolution of the 3270 product line and offers configurations capabilities, compatibility and features analyses.

The reports cost $45 each from the firm at Suite 200, 4040 Moorpark Ave., San Jose, Calif. 95117.

System Technology Forum Schedules Three-Day Seminars

BURKE, Va. — Six communications seminars that can be taken separately or in recommended combinations are presently being offered by the Systems Technology Forum, Inc., a company formed by Richard Deal and Ralph Berglund.

The three-day courses to be conducted this fall in various locations include "Introduction to Data Communications," "Advanced Design-Traditional Networks," "Network Architecture," "Voice Planning," and "Communications Technology Trends." Program prices range from $625 to $725.

Systems Technology Forum also offers a training audit that can be conducted over the phone to help interested parties determine training requirements and the best curriculum plans to fulfill them.

Both Deal and Berglund formerly developed and taught courses for Datapro Research Corp. before becoming independent consultants and speakers on the communications lecture circuit. They founded Systems Technology Forum to provide "structural training," a concept that applies instruction in what they consider a logical and progressive sequence.

Further details can be obtained from the firm at 8991 Cotwold Drive, Burke, Va. 22015.

Innovator 202 Printer Centered on Teletype 40

MIAMI LAKES, Fla. — Innovative Electronics, Inc. has extended the communications interface capability for a 300 line/min printer system based on a Teletype Corp. Model 40 printer.

The Innovator 202 offers interfaces compatible with Centronics Data Computer Corp. and Dataproducts Corp. parallel interfaces.

It also has Ascii serial asynchronous communications protocol support, the vendor said.

IBM Protocols

The Innovator 202 can be attached to IBM networks using the 2770, 2780 and 3780 protocols.

It is also compatible with Burroughs Corp. hardware via a poll/select protocol available with an RS-232, concatenation or Burroughs two-wire direct interface, the vendor said.

The printer costs $4,995 from the vendor at 15200 N.W. 60th Ave., Miami Lakes, Fla. 33014.

HP 300 RJE Tool Allows Linkage

PALO ALTO, Calif. — A remote job entry (RJE) software package for Hewlett-Packard Co.'s HP 300 reportedly enables the HP 300 to be linked to other computers for job submission and remote file transfer.

With the addition of RJE/300, the first communication enhancement to HP's RG Advanced Function System, the HP 300 now can emulate an IBM 2780/3780 transmission terminal while simultaneously processing local jobs, according to the vendor.

The RJE package consists of a microprocessor-based Bisync Communications Processor board and a software addition to the HP 300 operating system.

The board plugs into the HP 300 card cage and is connected to the general I/O channel. The board performs all handshaking protocols and processes the data stream during transmission.

Communications may be hard-wired or via modems over switched or leased lines. The Bisync Communications Processor costs $2,250 and the software package has a one-time charge of $500. HP is at 1501 Page Mill Road, Palo Alto, Calif. 94304.

Performance Monitor Gets Count Module

SALT LAKE CITY, Utah — Questronics, Inc. has released an additional module for its Model 500 performance monitoring system.

The Model 523 module collects the number of characters contained in each message and accumulates that figure. The module can track up to 32 different devices at transfer rates of up to 9,600 bit/sec, the vendor said.

The module costs $1,000 from Questronics at 3565 S.W. Temple, Salt Lake City, Utah, 84115.

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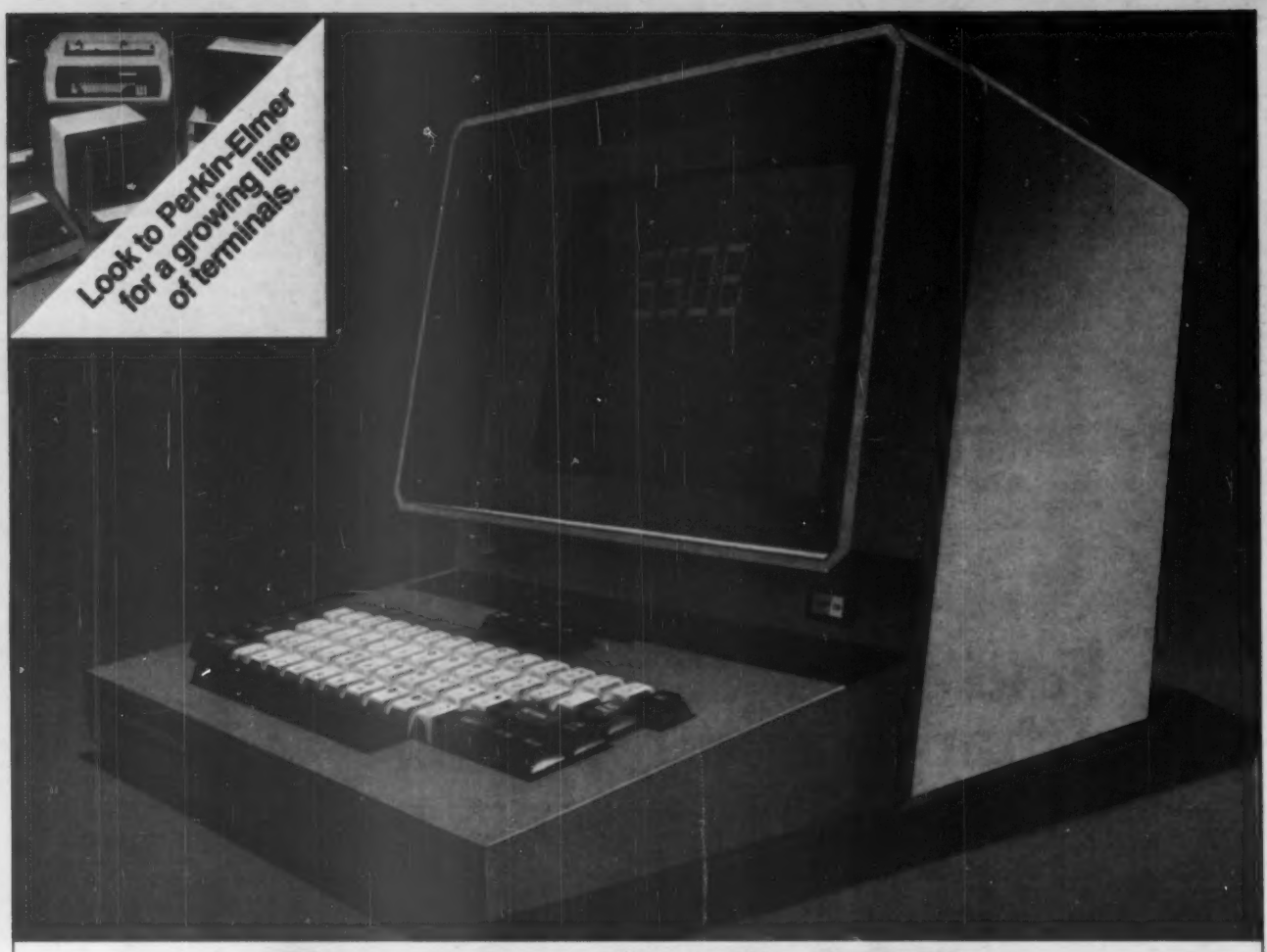

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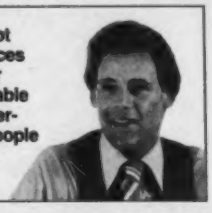

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How Big Is Big?

Shop Treats 370, 3033 as Batch Terminals

By Rita Shoor
CW Staff

CHICAGO — Just how big is an installation where mainframe cabinet size is a primary concern when shopping for new equipment?

Big enough to consider processors ranging in size from an IBM 370/158 to a 3033 as "batch terminals."

Big enough to keep two complete data centers with a total of eight IBM 3033s, two 370/168s and a lone Amdahl Corp. 470V/6 running on a full-time basis.

And that's just the beginning of the hardware list at Standard Oil Co. of Indiana here.

Two complete data centers are required to execute the production work, handle corporate time-sharing and support VM for the Standard Oil Organization, according to John Chapman, technical supervisor for major systems performance analysis. In addition to the three 3033s and two 168s operating in the Chicago center, another 3033 is expected to be installed during the first quarter of 1981.

Then there are the five 3033s and the Amdahl 470V/6 that form the core of the hardware configuration in Tulsa, Okla. Not to mention the IBM 3838 array processors for seismological data reduction of information about potential oil field locations that can be found in both sites.

The mainframes to which Chapman referred as batch terminals function in 12 remote locations and provide input over a wide-band 50K-bit network to Chicago and Tulsa. These do not include the approximately 60 remote locations that are tied into Chicago via their own communications wire or the unspecified number of additional links via dial-up lines.

Insight into the installation's size was provided by William Graese, supervisor in evaluation and standards of major centers for the firm. When asked about his expectations from IBM's long-predicted H series, he specified "more processing power in a physically smaller area" before mentioning that he would also expect to see a price/performance ratio comparable to IBM's 4300 series.

Disaster recovery planning is another item of concern at this data center, according to Michael Foster, manager of the user support and central control area for computer center operations here.

A disaster recovery committee with a formalized policy and set of plans is part of the firm's organization, he said. The last hardware disaster was caused by flooding that resulted in a power surge at Standard's former Chicago site in 1972.

"Our 360/85 was literally cooked," he recalled. The system was down for 10 days after that happened, but "we've never lost a data center," Foster observed.

However, backup and recovery plans to ensure data integrity are always based on the fact that such a disaster could occur at any time, Chapman pointed out.

Alternate site availability — a service being offered by several U.S. vendors as a solution for disaster recovery — would present some problems for Standard Oil.

For example, the number of software modifications made by the technical staff to its MVS operating system meant that any alternate site would essentially have to be a "first-level Standard Oil site," he said. Therefore, the Chicago and Tulsa data centers serve as primary backup sites for each other.

Commitment to IBM

Standard's current commitment is to stay within the IBM hardware and software mainstream, Chapman said. Even the Amdahl V/6 in Tulsa is slated to be replaced by a 3033. However, this doesn't mean that Standard won't be looking at IBM plug-compatible mainframes in the future, he said.

In the area of plug-compatible peripherals, technicians are currently evaluating Storage Technology Corp.'s (STC) 4305 semi-

(Continued on Page 70)

Increased User Satisfaction Becomes Major Emphasis

CHICAGO — What is a high-priority item in an organization where IBM 370/158 mainframes are described as terminals and about 175 people are required just to staff the computer room?

Increased user satisfaction is becoming the major emphasis at Standard Oil Co. of Indiana's data center, Technical Supervisor John Chapman explained during an on-site interview here (see related article).

Standard Oil is beginning to deal with the fact that hardware costs are going down and people costs are going up, he observed, and one step in this direction is the development of what he described as a "user service contract" (USC) for the company's performance analysis area.

Any contract is a mutual agreement between the supplier of a service and the user of that service, Chapman noted. An example of a USC might be an agreement to deliver support so that a certain number of transactions can be processed at a specified response time during certain hours of the day for a particular CICS application.

"The USC forces the user to articulate exactly what he needs and we, in turn, are required to tell the user what will be provided," he continued.

Standard has put one USC in place as an experiment and will probably develop more USCs before the end of 1980, according to Chapman. "Internally, we have to view our users as customers. They handle the oil and [consequently] they handle the money."

User Reaction

User department reaction to the USC concept is generally positive, Chapman said. "We have the user report on its perception of the service received including the man-hours lost and transaction backlogs due to system problems."

The USC also provides the technical staff with quantification tools, he explained. "If we're meeting our goals, we're doing a good job. If not — and the reason we're not is that the user is processing more than the specified number of transactions — we have a vehicle for tracking the problem."

The firm's upper management sees quantified results as the contract, which naturally increases the motivation to meet the USC's specifications, he pointed out.

Another potential use for the USC is as an aid in capacity planning. Capacity planning was often done on an ad hoc basis in the past, Chapman noted. Equipment might be acquired to use up the hardware budget or to allow for the possibility of a worst-case situation.

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Bits & Pieces

Graphics Systems Handle Engineering Applications

BROOMALL, Pa. — A family of turnkey graphics systems for engineering applications that feature automatic high-speed data capture from existing documents with drum scanners or large-area laser scanners has been introduced by Broomall Industries, Inc.

The Scan-Graphics Acquirer models utilize the firm's Super-Vec software for real-time raster-to-vector data conversion, offering one-step scanning and vectoring and achieving minimal file sizes for electronic storage, the firm said.

The Acquirer 1000 model includes a Univac V77-400 CPU with 64K words of memory, 800 bit/in. magnetic tape unit, 10M-byte disk unit, Broomall's D-400 drum scanner and Super-Vec software. The family of systems ranges in cost from $188,000 to $560,000 from the vendor at 700 Abbott Drive, Broomall, Pa. 19008.

Trident T-600/602 Drives Available Early Next Year

ANAHEIM, Calif. — Century Data Systems, Inc. has announced its Trident T-600/602 disk drives, which will be available early next year.

The 516M-byte drive is compatible with the T-200 and T-300 models, but has more capacity because it uses narrower heads of manganese zinc ferrite core, which reportedly has increased output by as much as 25% and resolution up to 5%, the vendor said.

The price for both the T-600 and the T-602 is $13,400, the vendor said from 1270 N. Kraemer Blvd., Anaheim, Calif. 92806.

3M Introduces Disk Pack For Century Data, Ampex

ST. PAUL, Minn. — The 3M Corp. is offering a 300M-byte disk pack for Century Data Systems, Inc.'s Trident T-300, Ampex Corp.'s DM9300 and compatible disk drives.

The Scotch 947/300 consists of 10 disks with 15,352 primary and 133 alternate recording tracks.

The unit costs approximately $1,075 from 3M through P.O. Box 336000, St. Paul, Minn. 55133.

Mainframes Act As Batch Units

(Continued from Page 69)

conductor disk in comparison to IBM's 2305 Model 2, he continued.

There were initially several component failures on the 4305. These were traceable to substandard parts that have since been replaced, he noted.

Although formal benchmark statistics are not yet complete, the Resource Measurement Facility indicated that service time for pages is better from the 4305 than from the 2305 by a small fraction, according to Chapman. If this type of reliability continues, future plans may include upgrading from a 22M-byte 4305 emulating two drums to a device that emulates four 2305s.

Long-Range Plans

Long-range plans at the currently IBM-based installation include development of an integrated voice/data network over the next five to eight years, according to John Sandberg, a manager in network design, implementation and performance.

"We're trying to determine corporate needs in terms of teleconferencing," he continued. An across-the-board test bed is being set up to help in selecting the set of communications tools that will best meet the needs of the largest number of users.

"If you leave this selection completely up to engineering and technical specialists," Sandberg noted, "you might incorporate some elements that would be difficult to justify on a cost/-benefit basis. It's the users who pay the bills," he remarked.

A "long-range fantasy" is to enable a person at one terminal to go from one IBM software system to another — from the Time-Sharing Option (TSO) to IMS to CICS, for example — through the simple expedient of entering a terminal command, Chapman said. "Right now, a person sitting at a TSO terminal can only get to TSO," he explained.

The only current means of getting around this is to run two wires into the terminals and provide a hardware switch to go between two systems, he said.

However, he said that Virtual Telecommunications Access Method (Vtam) software was "improving and becoming more operable" and described it as allegedly capable of handling this type of system switching capability.

Finally, although both of Standard's corporate data centers are considered physically secure, Chapman predicted an increased stress on data security during the next 12 months. "It's difficult right now for outsiders to get to the tools that would let them obtain unauthorized access to data," he claimed.

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Mini Bits

Cardamation Unit Reads 600 Card/Min

FRAZER, Pa. — Cardamation Co. has announced the first in a series of 600 card/min 80-col card readers.

The CR600, added to the previously announced 300 card/min, 400 card/min and hand-fed versions, is said to operate at 600 card/min on a demand basis.

As a desktop reader, the unit weighs less than 70 pounds and includes a 1,000-card input and stacker, fiber optics, card transport, casework, electronics and parallel output.

A vacuum feeder reportedly allows the feeding of worn cards, minimal card jams and ease in removing cards from the transport mechanism, according to the vendor.

In addition to the standard parallel interface, the CR600 is available with RS-232C communications output, as well as Digital Equipment Corp. PDP-11, LSI-11 and IBM Series/1 interfaces.

List price for the CR600 is $4,375, or $3,260 for a quantity of 25 from the firm at 9A Frazer Mall, Frazer, Pa. 19355.

Printer Controller Works on DG Minis

MELVILLE, N.Y. — Ventra Systems Corp. has announced a multiple printer controller for Data General Corp. minicomputers.

The microprocessor-based unit, Model VIP-201, plugs into a single slot on any DG minicomputer. It controls independent line printers with Dataproducts Corp. or Centronics Data Computer Corp. interfaces as well as the 300 line/min Teletype Corp. Model 40 printer, the firm said.

The unit costs $2,400, from the firm at P.O. Box 714, Melville, N.Y. 11746.

DLP-3300 Controller Gets Enhancements

SAN DIEGO — Datasystems Corp. is offering enhancements to its DLP-3300 line-printer controller for IBM Series/1.

The DLP-3300 now features increased diagnostic capabilities, in addition to providing direct memory access (DMA) interfacing between Series/1 minicomputers and printers offering either Centronics Data Computer Corp. and/or Dataproducts Corp. compatibilities, the vendor claimed.

The DLP-3300 provides an external self-test that verifies operation of printer and cable. The internal self-test performs diagnostics functions that test more than 90% of the controller circuitry and display diagnostic as well as operational status via seven LEDs.

The price for the product is $1,825, the vendor said from 8716 Production Ave., San Diego, Calif. 92121.

TI Single-Board MPU Supports Basic

DALLAS — Support for the Basic language is part of the packaged University Board introduced by Texas Instruments, Inc.

The TM990/189-1 is a single-board microcomputer that can be used in learning high-level languages, 16-bit microprocessor fundamentals and interfacing techniques, as well as demonstrating TMS9900 family memory-to-memory architecture.

It comes with TI's University Basic Read-Only Memory kit and has additional features not found on the original University Board. These features include 1K bytes extra random-access memory.

The packaged University Board costs $399 from TI distributors. TI can be reached at P.O. Box 225012, M/S 308, (Attn: TM990/189-1), Dallas, Texas 75265.

Micro-Sci Diskettes Give Apples Storage

ORANGE, Calif. — Micro-Sci has announced two diskettes for Apple Computers, Inc. microcomputers.

The A-40 provides 40 tracks of storage and an additional track to monitor speeds up to 5M/sec. The A-70 offers 70 tracks.

The A-40 costs $495 for the first unit and $395 for each additional unit. The A-70 costs $675 for the first unit and $575 for each additional unit, the vendor said from Suite E, 1405 E. Chapman, Orange, Calif. 92666.

Mini Lets Police Force Seek, Analyze Clues In Predicting Crime

Special to CW

SIMI VALLEY, Calif. — Police here in this small southwestern California town are using a minicomputer system not only to track criminal activities, but also to find out where and when the next crime will occur.

The Data General Corp. 4/X computer, programmed with Crime Analysis System Support (Cass) software, allows police investigators to quickly search for patterns in crime incidents or criminal behavior, in effect developing their own leads. The system tracks and analyzes a territory covering 27 square miles and filters through crime reports from throughout this city of 78,000 residents, Deputy Police Chief Ralph Ioimo said.

"Investigators don't usually have the time to search every report from the field for patterns or clues for their own cases," he explained. And, "it's important to develop this type of lead quickly."

Data for the Cass files, whose software was developed by Simcon, Inc. of McLean, Va. under funding from the Law Enforcement Assistance Administration (Leaa), comes from five sources: stolen property reports, crime reports, arrest reports, field interview reports and pawn shop slips, Ioimo continued.

From these, entry operators at Dasher CRT terminals input dates, places, times, physical descriptions, reported methods of operation, stolen property identification, vehicle descriptions and descriptions of items sold to local pawn shops (the latter information is required from pawn shops by law).

Sifting and Choosing

With all this data in computer memory, Simi Valley's police can retrieve, list, sort, sift and link it along any characteristics they choose, Ioimo said.

For example, if a crime analyst or investigator notices several similar crimes in a neighborhood, he can enter the dates, locations and method of operation (MO) and run these against the MO file for known suspects. The computer will list any possible known suspects, and it will generate leads.

"This happens all the time," Ioimo noted. For instance, "from a recent rape report we extracted the rapist's description and requested a matching search across all files. As it turned out, one of our officers on patrol had earlier interviewed a suspicious person. The man's description in the officer's field interview report matched the rapist's, and we had a prime suspect.

"Of course, the system is not intended to eliminate the need for people in the investigative or judicial processes. It just helps us out by generating leads very quickly," he added.

In searching for these leads, Cass users can retrieve across complete files or parts of files. Up to six files can be searched on up to 25 criteria, testing for relationships of equality; nonequality; greater than; less than; greater than or equal; within a range of input; or for individual characters in a record.

Also, searches can be made when only partial data is available, such as when only the last three of seven digits of a license plate are known.

After a search, the computer reports the number of qualifying records. The user can elect either to cut this list down with additional selection criteria, or to save the qualifying records in a new file for output or analysis.

Analyses Available

Statistical analysis routines can provide maximum and minimum data values, median and mean values, variance, standard deviation, coefficient of variation, standard deviation of the mean, weighted mean, weighted variance, weighted deviation, frequency distribution and multivariate curve fitting.

Output graphics include histograms based on frequency distribution, scatter diagrams showing

(Continued on Page 74)

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The Level 6 has also been helping Wisconsin Life develop new applications for their transaction processing capability. For instance, there's a program in the works now that will enable them to process all new business on-line.

One advantage is that the computer can be used to calculate premiums, thus eliminating a great deal of work currently done by hand.

Finally, the Level 6 runs a very efficient data entry facility. Once CRTs are installed, clerks will be able to correct errors immediately, substantially reducing overall system maintenance costs.

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Rxpedite System Offered For Single, Chain Pharmacies

MILWAUKEE, Wis. — A pharmacy system for retail and nursing home pharmacies called Rxpedite is being offered by Health Information Systems, Inc.

The system reduces the pharmacist's time in filling and refilling prescriptions, automatically prices prescriptions, offers allergy, drug and interaction information and handles third-party insurance billings, Health Informations Systems said.

Rxpedite is the only pharmacy system available utilizing IBM's Series/1 computer that can be used by multiple stores, according to the vendor.

The system also offers continuing hardware maintenance through IBM's nationwide service network and software support via direct phone communication to Rxpedite's Technical Support Center. The system is written in EDX and utilizes IBM's 3101 CRT terminals. The system runs on a 4952 or 4955 processor, depending on the store size.

Rxpedite costs between $16,000 and $24,000, depending on whether it is to be used in a single store or for a chain of stores. The vendor is located at Lincoln Professional Center, Suite 202, 10401 W. Lincoln Ave., Milwaukee, Wis. 53227.

Replace 2230s, 2260s

DS 990s Get TI Printers

HOUSTON — Two dot-matrix line printers that provide optional hard-copy output for Texas Instruments, Inc. DS990 computer family models 4, 6, 8, 20, and 30 have been introduced by TI.

Both printers use raster and dot-matrix technology on a 9 by 7 matrix. They print at speeds of 300- and 600 line min, respectively, using a 96-char. Ascii, 132-col format. In addition to operating in the character print mode, the LP 300 and LP 600 may be used in plotting applications with user-developed software.

The LP 300 and LP 600 are designed to replace the current 2230 and 2260 printers offered with the DS990 family.

Priced at $9,750 and $13,750 respectively, the models LP 300 and LP 600 include the printer, pedestal, paper basket, paper, parallel interface, 30-ft cable, quietized cabinet and an operation and installation manual.

TI can be reached at P.O. Box 1444, M/S 7784 Houston, Tex. 77001.

Tape System Fits Multibus

SAN DIEGO — An IBM/Ansi-compatible magnetic tape system that is plug-compatible with the Intel Corp. Multibus is available from Innovative Data Technology, Inc. (IDT).

The Model INTL-1050 consists of a single-card tape controller that connects to the IDT Model 1050 formatted tape transport.

The complete subsystem uses a dual-density 9-track, 45 in./sec tape transport for either 800 char./in. (NRZI) or 1,600 char./in. (phase-encoded) providing more than 40M bytes of data storage on a 2,400 ft. reel of tape 10.5 in. in diameter.

Error recovery, interrupts, status and diagnostic primitives are resident in 4K bytes of on-board eraseable programmable read-only memory (Eprom).

The price for the 1050 master system is $7,750 with additional daisy-chain drives available at $4,250 each, the vendor said from 4060 Morena Blvd., San Diego, Calif. 92117.

Mini Helps Predict Crime

(Continued from Page 73)

both data and fitted curves; and time series line graphs.

The Cass system allowed Ioimo to define those files he wanted maintained and to set authorized users for each file. But, for changing file structures after initialization, Cass offers purge, reorganization and expansion routines and programs that format disk storage, copy and sort files.

Simi Valley's Cass installation includes a DG Nova 4/X CPU with 128K bytes of memory, 10M bytes of disk storage, one Dasher LP2 printer and five Dasher D2 CRTs. The software is written in Basic for the Rdos operating system.

Not surprisingly, other state and local agencies have shown an interest in the computer-based tracking system, especially those constrained by California's controversial Proposition 13, which cut back on local governmental operating budgets, Ioimo said.

"Computers can cut labor costs in law enforcement because the field depends so heavily on storing and retrieving information. We need fewer data entry and retrieval personnel with the computer and can perform more complicated analyses faster," he observed.

Free Brochures

- A condensed catalog has been composed by Connecticut Microcomputer, Inc. to describe its expanded offerings. It can be obtained by writing "1980 Brochure," Connecticut Microcomputer, Inc., 34 Del Mar Drive, Brookfield, Conn. 06804.
- Diva, Inc. announces "DD 70 Series Disk Storage Systems from PDP-11/70 Processors," and "DD 40/50 Series Disk Storage Systems for PDP-11 Unibus Processors" from 607 Industrial Way W., Eatontown, N.J. 07724.

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Cromemco Unveils S-100 System

MOUNTAIN VIEW, Calif. – Cromemco, Inc. has announced System Zero, an S-100 bus system for dedicated applications in engineering, science and medicine as well as for other professional applications.

Based on Cromemco's Z80A-based single-card computer, the unit comes with 1K byte of random-access memory (RAM) and 3K bytes of Control Basic in read-only memory (ROM), the vendor said.

System Zero was designed for ROM-based programs, but it can be expanded to use Cromemco hard or floppy disk subsystems, according to the vendor.

A special version of the microcomputer, System Zero/D, is ready for use with floppy disks. System Zero/D includes 64K bytes of RAM, the vendor said.

The System Zero line supports RPG II, Fortran, Cobol, 32K structured Basic, 16K Basic and Lisp, as well as word processing, data base management and business application software, according to the vendor.

The basic System Zero – Model CSO – costs $995; System Zero/D costs $2,995; and a dual disk drive system – Model DDF – costs $1,295 from the vendor at 280 Bernardo Ave., Mountain View, Calif. 94043.

S-100 Gets I/O Processor

MOUNTAIN VIEW, Calif. – Cromemco, Inc. has introduced an I/O processor that reportedly provides multiprocessing capabilities for Cromemco S-100 bus microcomputers.

The Model IOP is a single card, Z80-based microprocessor with 16K bytes of random-access memory and up to 32K bytes of programmable read-only memory, the vendor said.

Model IOP costs $695 and is available from the vendor at 280 Bernardo Ave., Mountain View, Calif. 94043.

Micro Backs Multiple Users

OAKLAND, Calif. – A system for multiuser applications has been introduced by Digital Microsystems, Inc. The DSC-4 consists of a Multibus-based Z80A processor board and one or more 128K random-access memory (RAM) boards.

Each board contains four RS-232 serial ports and two 8-bit parallel ports. Extra card slots allow for the addition of user-specified Intel Corp. Multibus-compatible boards.

DSC-4 users can utilize software written under CP/M, MP/M and single- or multiuser Phase One System, Inc. Oasis.

The DSC-4 system with 128K RAM costs $6,950 from the vendor at 4448 Piedmont Ave., Oakland, Calif. 94611.

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Hot on Trail for Top Execs, High-Tech Firms Raise Ante

LOS ANGELES — Hot on the trail of top executives, 79% of California's high-technology firms said they have substantially liberalized their relocation benefits and 56% reported they anticipated increased benefits in the next year, according to a recent survey.

Driving the need for more generous relocation benefits are housing prices, which in California hover around an average of $100,000 compared to $74,000 for the rest of the country, reported William C. Houze of Houze, Shourds and Montgomery, Inc., the firm that performed the survey.

Addressing the recruitment of executives in the $50,000 and above salary range, the survey found reimbursement for real estate commissions was "frequently or always" offered by 76% of the high-technology firms reporting. This was the most common benefit cited by this class of company, the report said.

The report was conducted among 350 of the largest publicly held companies in California.

Significantly, the survey also found that a growing number of high-technology firms are willing to provide financing as an incentive for executive relocation. Some 39% of the high-technology firms

(Continued on Page 82)

IBM to Make Radical Change In Product Line, IDCer Predicts

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — IBM is likely during the 1980s to introduce a new generation of software systems and a new hardware architecture that will mark the most "radical" change in the company's product direction in the last 20 years, a research director with International Data Corp. (IDC) predicted here recently.

The future architecture, which will probably be accompanied by new operating systems and major application subsystems, is expected to be as fundamentally different from its Series 360 counterpart as the Series 360 scheme was from the architecture that immediately preceded it, according to IDC's William Zachmann.

Hints of what the new architecture will probably look like can already be found in the hardware design of recent IBM offerings like the 8100 Information System and — to a lesser extent — in the System/38 and Series/1, according to Zachmann, who directs research for IDC's Information Systems Planning Service.

(Continued on Page 82)

Memorex Tightening Its Belt By Streamlining Manufacturing

By Jeffry Beeler
CW West Coast Bureau

SANTA CLARA, Calif. — Memorex Corp. has embarked on a major cost-cutting effort that will focus special attention on streamlining the company's manufacturing operations, according to the firm's chairman and chief executive officer, Clarence Spangle.

As part of the streamlining effort, Memorex has already consolidated all its manufacturing activities — both end-user and OEM — into a single organization headed by the firm's Peripheral Equipment Group (PEG) president, William Bayer, Spangle said.

The consolidation will enable Memorex to boost production volumes and cut unit costs for many of its products, especially the Model 3652 disk subsystem, a 1.27G-byte equivalent of IBM's Model 3350.

The reorganization will also allow Memorex to eliminate duplication in its end-user and OEM production operations and increase the "bang" the firm gets for its manufacturing "buck," Spangle said.

Loss Rate Slackens

Memorex's efforts to streamline its activities and thus trim its administrative and operational costs appear to be having the desired effect, at least to a certain extent. The company continues to lose money, but the rate of loss appears to be slackening.

During the second quarter of the current fiscal year, for example, Memorex lost $21.7 million on revenues of $185.7 million, while during the following quarter, ended in September, the firm's pretax losses dipped to $6.2 million on sales of $189.9 million.

Spangle's remarks about Memorex's cost-cutting efforts kicked off the company's

(Continued on Page 78)

HP Planning 32-Bit Mini

By Brad Schultz
CW Staff

PALO ALTO, Calif. — Plans for the imminent announcement of a 32-bit minicomputer prompted Hewlett-Packard Co.'s reorganization of its computer manufacturing operations last summer.

Internally known as Vision, the mini is backward-compatible with HP's existing 3000 family of systems and will eventually replace them, *Computerworld* has learned.

Vision's hardware and software will come from two divisions — Computer Systems and Information Systems respectively — which joined the General Systems Division as HP's Business Computer Group [CW, Aug. 25].

According to a spokesman, General Systems will address the burgeoning market for systems costing less than $25,000, while outperforming the most sophisticated programmable terminals.

But the advent of Vision, which is expected to make HP more competitive against Digital Equipment Corp., Prime Computer, Inc. and other suppliers of so-called "superminicomputers," is clearly the reason for most of this reorganization.

Commercial Systems

In Pinewood, England, HP is starting a commercial systems operation to develop and market Vision software. And certain products for the low-end Visions will come from HP's revamped Desktop Computer Division.

However, a data communications program is also starting, the spokesman said, and will relieve HP's General Systems and Technical Computer Group of much responsibility for guiding the vendor's entry into the remote

(Continued on Page 78)

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Memorex Tightening Its Belt in Manufacturing

(Continued from Page 77)

first OEM "press day," which was highlighted by the firm's "first comprehensive press tour" of its Recording Technology Center (RTC). The tour covered the RTC's dozen or so applied research laboratories, where Memorex is developing the heads and media for thin-film disk systems that will eventually compete with IBM's Models 3370 and 3380.

Memorex has already developed a working prototype of its 3370-type disk system and is well on its way toward completing an experimental version of its 3380-type unit, which might be introduced as early as the spring of 1982, a company spokesman said privately.

In conducting the tour through its RTC laboratories, Memorex was clearly trying to show that, despite recent financial setbacks, it still feels it has the technological wherewithal to compete with IBM in the end-user disk system market.

OEM Commitment

Memorex also used the press-day proceeding to reemphasize its renewed commitment to the OEM market. Reiterating views expressed several weeks earlier by PEG's President Bayer, Spangle told members of the trade press that the shift in his company's business strategy represents an attempt to capitalize on the rapid growth in the low-cost, high-volume OEM market.

The microcomputer sector of that market is expanding at about 75% per yr, even faster than the minicomputer sector's 50% annual growth, Spangle said. The end-user side of the computer business, by contrast, is growing only at an estimated 15% per yr.

"It doesn't take too much arithmetic to figure that the OEM business, while relatively small now, can be as big as the end-user business within a few years," Spangle said. "We intend to be running with it and, in fact, to be in the front of the pack."

No Exit

Memorex's increased emphasis on the OEM sphere, however, in no way signals its exodus from the end-user business. "That's the biggest piece of the Memorex pie right now, and it's not shrinking," Spangle said. "The pie is just getting bigger, and we certainly intend to maintain and even enhance our share."

Memorex regards the OEM market as another channel of distribution for its products rather than as a substitute for its end-user business, Spangle added.

In other comments, the Memorex chairman credited his company with bringing several competitive advantages to the OEM disk systems market. The first purported advantage is experience.

Memorex's participation in the OEM sector dates back to 1967. As late as 1974, OEM sales accounted for only about 2% of the firm's total revenues. Today, that share stands at 15%, and company officials reportedly expect the figure to continue growing during the years to come.

Another of Memorex's competitive strengths in the disk systems field, Spangle said, is that it manufactures all its own media. As if to emphasize that point, the company used its press-day conference as an occasion to introduce its so-called "M Formula" coating for 8-in. and 14-in. ferric oxide-coated rigid disks.

Common Technology

A third important advantage is that the firm's end-user and OEM products use a common technology, Spangle explained. The same read/write heads, magnetic media and electronics that Memorex originally developed for its end-user and customers are now being applied to the OEM side of its business.

This strategy of sharing technology between two markets purportedly enables Memorex to maximize the return from its research-and-development dollar.

Yet another of the company's reported competitive advantages is its position in the international OEM market. Memorex entered the international arena during the mid-1960s and now derives half of its total revenues from its sales activities in Western Europe, Japan, Canada and Australia, Spangle said.

The firm is currently hiring a manager for its international OEM marketing organization headquartered in London, Spangle added.

Info Sci Names Three VPs

MONTVALE, N.J. — In order to update its products to reflect the technology of the 1980s, Information Science, Inc. (Info Sci) has named three new executives, according to Jack Hight, the firm's president.

Leo Kornfeld was named senior vice-president and president of the Informaiton Services Division. He was formerly a senior officer of Cresep, McCormick and Paget, Inc., a consulting firm acquired by Citicorp.

Also named a senior vice-president and president of field operations was Brian Aspland, formerly with Interactive Data Corp., which was acquired by the Chase Manhattan Bank. Aspland will concentrate on building InSci's sales force.

Kornfeld and Aspland have joined the firm within the past month.

In addition, within the past few months Daniel Federman was named senior vice-president and chief financial officer. His most recent position was vice-president of planning for the National Broadcasting Co.

HP Planning 32-Bit Mini

(Continued from Page 77)

processing marketplace.

The Computer Systems Division was given control of the 3000 supermini family, including associated operating systems, precisely because Vision products will replace those offerings.

As HP's first software division, Information Systems will produce commercial languages, data base management packages and utility programs for Vision as well as for the HP 3000 minicomputers, which will migrate into the Vision stream eventually.

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'Violent Monetary Trauma' Ended; Economist Predicts Good Year for DP Industry

By Marcia Blumenthal
CW Staff

NEWTON, Mass. — The recession has ended, but it was such an unusual one that Albert Summers, chief economist for the Conference Board, labeled it a "violent monetary trauma."

Whatever term is preferred, it looks as though the computer industry is in good shape for the coming year.

The historic two-quarter lag for a downturn in the industry as happened in previous recessions won't happen in 1981, maintained Arthur Carr, president of Codex Corp. and vice-president of Motorola, Inc.

"There's too much growth momentum in the industry and not a serious enough problem in the economy," added Ray Stata, chairman and president of Analog Devices, Inc.

Stata and Carr were two of the executives sharing the podium at the 1981 Forecast Forum sponsored here recently by the New England Council of the American Electronics Association.

Industry Dichotomy

Although the tone of the forecasts was optimistic, executives were cautious, agreeing 1981 would be a good year, but not a great one.

Part of this posture is a result of what Digital Equipment Corp.'s Andrew C. Knowles called a "dichotomy in the industry." Money is expensive, which puts pressure on commercially oriented businesses, noted Knowles, vice-president of DEC's Technical Group. This group oversees products for engineering, education and laboratory sectors, among others.

However, manufacturing plants in the U.S. are antiquated and need to be automated in order to compete with Japan. Real-time and distributed processing systems for engineering, manufacturing and control will flourish in the next few years, Knowles predicted.

DEC's 34% increase in revenues for its latest quarter was largely attributable to noncommercial systems, he said.

While revenues at DEC were up 34%, mainframers such as Burroughs Corp. and NCR Corp. have experienced declines in orders in recent quarters, which have showed up in both revenues and earnings at these firms.

Emphasizing the current weakness of the commercial sector, Knowles claimed these companies cannot change gears because they do not have the real-time software needed for the industrial market.

Although the economy has been tight, DEC recently announced it will spend $400 million on plant and equipment, double the amount spent last year.

Another phenomenon that affected earnings of industry vendors during the past year was users' preference for leasing over purchasing equipment. However, Codex' Carr expects the lease-to-purchase ratio for various segments of the industry to return to normal after the second quarter of 1981. In addition, income from leases will begin to have a positive effect on balance sheets during 1981, he maintained.

Despite the recovery, Carr thinks the prime rate won't go below 10% and inflation will remain at an 8% minimum throughout the next few years. There will not be a sharp snap-back as there was in 1977 after the last recession.

On a cautionary note, most of the panel expressed concern about the recession in Europe, which is expected to intensify through the next year. This, they believed, will undoubtedly cause some difficulty for companies with heavy European sales.

In the semiconductor arena, things are considerably brighter compared to previous recessions, Stata pointed out. Although there may be hiring freezes at some semiconductor firms, there were no major layoffs like those of the last recession, which saw layoffs of up to 25% of the workers at some firms.

Although there has traditionally been a high correlation between the downturn in the economy and the state of the semiconductor industry, its intensity is not as severe as in previous dips. This time the multiplier for the ratio of the peak-to-trough downturn in industrial production compared to semiconductor production is about one to one, Stata observed. In previous downturns, the multiplier was as high as six.

Overall, the semiconductor industry should grow 18.5% annually until 1985 compared to an average annual growth rate of 20.5% for 1975 to 1979, according to the Semiconductor Industry Association.

Good Sign

A particularly good sign for semiconductor vendors is the continued preference of some major component consumers such as Western Electric and IBM to purchase mammoth quantities of devices from outside sources, rather than beefing up captive sources, Stata said.

And, the "U.S. is a lot more chauvinistic than it is given credit for," he stressed. "It's one thing to buy Japanese components when there is a shortage, but another thing when there is an adequate supply."

Despite periodic downturns in the economy, the computer industry should focus on the noncyclical demand factors driving the industry, Stata advised. Elasticity is still prevalent in the industry. And inflation is always good for the electronics industry, especially as the low end of the wage scale climbs.

Contracts

Leasametric, Inc. has received an exclusive General Services Administration contract for general-purpose automatic information processing equipment.

Data Pathing, Inc. has signed a $750,000 contract with the Kennedy Co. for Kennedy's Series 9000 tape transports, and the Lohm Corp. has awarded Data Pathing a $150,000 contract for the Kennedy 9700 tape drive transports for use in computer-controlled automatic branch telephone exchange systems.

Robert Seaman of Raytheon Co. (left) and Andrew Knowles of Digital Equipment Corp. take a breather from discussing the state of the economy at the recent 1981 Forecast Forum.

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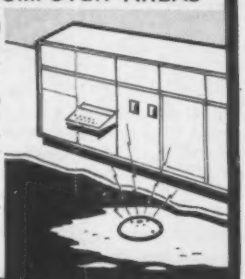

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Mini Earnings Rise 22% to 91% in Quarter

Major mini makers showed increases in earnings ranging from 22% to 91% for their latest quarters.

Prime Computer, Inc. led the earnings dash, posting net income of $8.1 million or 41 cents per share compared to income for the prior year's third quarter of $5.4 million or 31 cents per share.

Revenues for the third quarter were $69.7 million, a 73% jump from the $40 million in sales reported in the corresponding quarter a year ago.

For the first three quarters, Prime's earnings were $21.2 million or $1.10 per share compared to earnings of $11.8 million or 67 cents per share.

Revenues for the year to date advanced 74% to $182.2 million from $104.8 million in the prior year's nine-month period.

At Wang Laboratories, Inc., first-quarter earnings for fiscal 1981 rose 84%, reaching $11.9 million or 42 cents per share compared with earnings of $6.5 million or 26 cents per share for the prior fiscal year's first quarter.

Revenues rose 65% to reach $156.5 million, up from $95 million reported in the prior year.

Orders during the first quarter added $61 million to the company's backlog.

DEC Earnings Up

Digital Equipment Corp. reported a 24% increase in its first-quarter fiscal 1981 earnings and topped $56.2 million or $1.17 per share, up from $45.2 million or $1.02 per share in the corresponding period of 1979.

Revenues grew to $479.2 million, a 34% increase from revenues of $362 million for the prior fiscal year's first quarter.

Of particular note were customer service revenues of $175 million, which rose 40% during the first quarter, DEC said.

DEC also reported strong sales for its Vax-11/780 32-bit system. DEC expects to spend $400 million on plant and equipment during its current fiscal year, about double the expenditures for last year.

DG's Profile

On a more somber note, Data General Corp. reported a 22.3% increase in earnings for the final quarter of its latest fiscal year, but overall earnings for the year advanced a scant 9.8%.

For its last quarter, DG reported earnings of $16.4 million or $1.54 per share, compared with the $13.4 million or $1.27 earned for the same period last year.

Revenues for the fourth quarter grew 25%, reaching $214 million from $171 million last year.

For the full year, DG's revenues were $654 million, up 29% from $507 million for the prior fiscal year.

Earnings for the year were $54.7 million or $5.20 per share, compared with earnings of $49.8 million or $4.82 per share last year.

"Fourth quarter 1980 results reflected growth at a slower rate than the preceding quarter due to reduced order rates," said Edson D. De Castro, DG's president. De Castro said economic uncertainties may continue to adversely affect delivery of the firm's product through the first half of fiscal 1981.

Magnuson Earns $917,000

SAN JOSE, Calif. — Magnuson Computer Systems, Inc. reported third-quarter earnings of $917,000, or 18 cents per share, and revenues of $8.2 million.

This compares to a loss of $172,000, or 19 cents per share, and revenues of $3.9 million for the comparable 1979 period.

For the year-to-date, earnings reached $2.4 million or 58 cents per share, compared to a loss of $2.6 million or $1.61 per share a year ago.

Earnings per share are based on an increased number of shares outstanding as a result of the company's initial public offering on June 25 of 1.1 million shares. Earnings also reflect a tax loss carry-forward of $1.1 million.

Revenues totaled $20.7 million, up nearly four times the revenues of $5.5 million for the first nine months of 1979.

Commenting on the results, Joseph L. Hitt, president and chief executive officer, said, "an important achievement during the quarter was our ability to nearly double production in the month of September to meet orders.

"We anticipate maintaining our production levels in the fourth quarter at this new higher rate," Hitt added.

STC Quarterly Revenues Up 12.5%

LOUISVILLE, Colo. — Storage Technology Corp. reported a modest 7% gain in earnings and a 12.5% increase in revenues for its third quarter.

For the latest quarter, STC's earnings totaled $12.1 million or 46 cents per share, up from $11.3 million or 45 cents per share in the comparable 1979 quarter.

Revenues grew to $117 million, up from $104.3 million for 1979's third quarter.

For the year to date, STC's earnings were $31.4 million or $1.22 per share, up 11.3% from the $28.2 million or $1.12 per share during the comparable nine months of 1979.

Revenues to date grew 22%, reaching $327 million, up from $267.6 million for the same period last year.

Although the company made no comments on its earnings for the latest quarter, both earnings and revenues have moderated this year. For its last fiscal year, the firm's revenues grew 60% and earnings grew 48% from the prior year.

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Cbema Elects James Mellor Chairman

WASHINGTON, D.C. — James Mellor, president of AM International, Inc., has been elected 1981 chairman of the board of directors of the Computer and Business Equipment Manufacturers Association (Cbema) and H. Glen Haney, vice-president of marketing at Univac, was named vice-chairman.

Albert Mullin Jr., director of corporate affairs at Digital Equipment Corp. and Don Riley, director of corporate business intelligence of Xerox Corp., will co-chair the Plans and Policies Committee.

Maury Longsworth, director of government and industrial relations of Honeywell, Inc. will be chairman of the Foreign Trade Committee. He will be assisted by vice-chairman George Bardos, vice-president of marketing development of Control Data Corp.

Robert Beltz, physical distribution manager of 3M Co., will be chairman of the Physical Distribution Council; Jim Hall, director of staff services of Univac, will be the chairman of the Service Management Council; and Ed Nanas, director of information programs at IBM, will chair the Communications Advisory Committee.

Cbema's 36 member companies reportedly account for 85% of the business in the computer and business equipment field, with annual domestic revenues of $35 billion.

Comsat Vamps Operating Units

WASHINGTON, D.C. — Comsat General Corp., has announced the restructuring of its operating functions into three major units.

The three units, each headed by a senior officer with general management responsibility, are Satellite Systems, Communications and Information Products and Systems Technology Services.

William L. Mayo, vice-president, will head up Satellite Systems; Michael S. Alpert, vice-president, will be in charge of Communications and Information Products; and Burton I. Edelson, senior vice-president, will continue to head Systems Technology Services.

STC, Documation Sign Definitive Pact

LOUISVILLE, Colo. — Storage Technology Corp. (STC) and Documation, Inc. have signed a definitive agreement and plan of reorganization providing for the merger of Documation into STC.

Documation stockholders will receive .85 share of STC common stock for each outstanding share of Documation common stock.

The agreement and plan of reorganization is subject to the approval of the stockholders of Documation. Documation intends to call a special meeting of its stockholders this month for the purpose of obtaining such approval.

Carter's Embargo Cited

U.S.-Soviet DP Trade at Record Low

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Data processing equipment trade between the U.S and the Soviet Union dropped to a record low the first six months of 1980, according to the U.S. International Trade Commission (ITC).

U.S. computer exports to the Soviet Union were valued at only $200,000 during the first half of this year, the ITC said in a recent report to Congress. This compares with $17.6 million in such trade for the corresponding period of 1979.

Because computer trade with the Soviet Union has been steadily increasing over the previous five years and because the Soviets had come to rely on Western technology to boost several of its industry sectors, the cutback in American computer exports "may pose problems" for the Soviet Union as it plans for the next five years, the ITC said.

The commission attributed the sharp trade decline to the embargo of high-technology goods to the Soviet Union imposed by President Carter Jan. 4 in response to the Russian military intervention in Afghanistan.

The complete embargo was subsequently lifted in the spring, but technology trade with the U.S.S.R. is still significantly restricted. High-technology exports to that country, which totaled $46.4 million in the first half of 1979, reached only $17.4 million during the same period of this year.

Bilateral trade of all categories was down over 52% during that time, with almost all the decline attributed by the ITC to the U.S. trade restrictions.

Impact Assessment

Assessing the impact on the Soviet Union of the high-technology export restrictions, the commission said although the level of trade was never very high, the effect of trade sanctions "will be much more significant than the volume of this trade would suggest.

"Soviet hard-currency purchases of high technology from the U.S. have always been highly selective," the ITC report noted, "concentrating on computers and process controls crucial to their modernization efforts and incorporating unique technology."

The U.S. ban on these items "may pose problems for certain Soviet industries," the commission said. "It is believed that before the deterioration of U.S.-Soviet relations, the Soviets were interested in increasing their purchases of process-control instruments as one way of improving lagging Soviet productivity."

Since the sanctions were imposed, the Soviet Union has been seeking alternative sources for high-technology equipment and know-how, the report noted.

But because this search for substitutes comes while the Soviet Union is drafting its 1981-1985 economic plan, "not knowing whether key items will ultimately become available from the U.S. or from alternative sources can create uncertainty," the ITC said, and thus "unsettle Soviet planning in important areas."

Executive Corner

• John H. Clark has been appointed president and chief executive officer of Micom Data Systems, Inc. The former president of the Data Products Group at Itel Corp. will head up Micom operations at company headquarters in Dallas.

• Joe Schneider has been elected vice-president of finance at Data Electronics, Inc., where he will be responsible for all financial activities within the company.

• Robert Theriault has joined Century Data Systems, a Xerox subsidiary, as vice-president of market operations.

• Bruce Hamilton has retuned to TEC, Inc. as vice-president and general manager of the company's Component Products Group.

• Peter Hertan has been appointed to the newly created position of vice-president of marketing at the Nestar Systems, Inc., where he will be responsible for all microcomputer product marketing and support.

• Prentice Robinson has been named senior vice-president at Dataroyal, Inc., where he will be responsible for manufacturing operations.

• Marc Ayes has been made controller/treasurer of the Q1 Corp.

• B. Tom Carter Jr. has been named executive vice-president and treasurer of Wyly Corp. and its wholly-owned subsidiary, University Computing Co.

• William Slaughter has been elected vice-president of sales for the Bryan-College Station division of Agency Records Control, Inc.

• Lee Gendron has been appointed to the newly created position of vice-president of technical operations at IPL Systems, Inc.

• Ken Isaac has joined Century Data Systems as vice-president of engineering. He replaces James Conway, who has been appointed to the new position of vice-president of advanced planning and technology.

• Gresford Priestly and Steven Silberstang have been elected vice-presidents at DDP Systems, Inc.

Supershorts

Four-Phase Systems, Inc. recently announced that it is increasing its domestic sales force by 50%.

— — —

Bram International Ltd., a Scotland-based manufacturer, has established a U.S. division to market its productivity improvement product line.

— — —

D.C. Hayes Associates, Inc. manufacturer of the Micromodem II and 100 information communications systems, has changed its name to Hayes Microcomputer Products, Inc.

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Evans & Sutherland, Inc. has signed an agreement with Shape Data Ltd. of Cambridge, England, to market Shape's geometric modeling package, Romulus, in the U.S. and Canada.

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Weill Urges Collaboration

The place was Paris, the show was the Salon International de l'Informatique de la Communications et de l'Organisation du Bureau — better known simply as Sicob — and the guest of honor was Simone Weill, president of the European Parliament, who was shown some of Europe's latest technology on the exhibit floor.

In opening comments at the September show, Weill urged European computer corporations to collaborate under the best possible conditions to research new technology and called for the elimination of tariff duties, the establishment of a sound network of communications and the sharing of present data bases.

Weill expressed a special concern that attention be given to humanity and that isolation, lack of initiative and rigidity not become the result of a computerized society.

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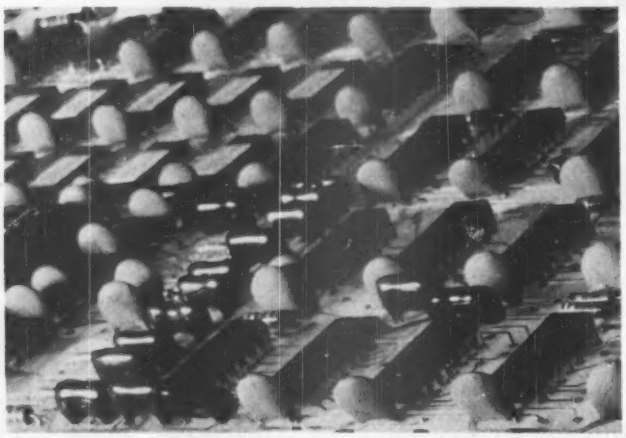

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The service can be ordered by writing International Data Corp., 214 Third Ave., Waltham, Mass. 02254.

Radical Change Predicted

(Continued from Page 77)

Zachmann described the 8100 as the first "radical departure" in IBM's large systems architecture since the 1960s, when the firm introduced its 360 series, which formed the architectural model for the industry giant's follow-on 370 series. Whether IBM's next hardware architecture will be a direct outgrowth of the 8100 or whether it will develop along entirely independent lines remains to be seen, Zachmann said at IDC's executive conference on "Improving Information Processing Profitability and Productivity During the 1980s."

The expected emergence of a new IBM hardware architecture, which could come as early as 1985, will result in significant user benefits, including dramatic increases in memory addressing space. But the shift in product direction will also create the need for a new IBM operating system and will prompt successors to its application subsystems like IMS.

If IBM had its own way, the company's new architecture and software systems would probably have already been introduced. But realizing its users could ill afford to abandon their $200 billion investment in existing programs, IBM has been forced to implement its future product plans cautiously, Zachmann said.

Painful Lesson

IBM still remembers the painful lesson it learned back in the 1960s, when many of its users bolted to competing vendors rather than brave the perilous passage to the then-new 360 architecture and operating system. The company is determined not to allow the next major shift in its product direction to provoke a similar mass exodus of its customers.

To that end, the firm is consciously using recent products like the 8100, System/38 and Series/1 to slowly acquaint users with the new systems concept that will underlie the vendor's next generation of software systems and hardware architecture, Zachmann said.

IBM's strategy appears to be based on the belief that the most painless way of converting users to a new architecture is to implement the scheme in gradual steps rather than all at once, Zachmann said.

High-Tech Firms Up Ante

(Continued from Page 77)

said they "frequently or always" offered a swing loan. "In the past, we rarely saw companies willing to become involved in financing arrangements," Houze noted.

In addition, 18% of those firms said they were willing to assume the relocating executive's mortgage obligation if the former home was unsold. That same percentage of firms also indicated they were willing to assist in job placement for the spouse in a two-career family.

Break With Past

Another surprising finding of the survey was that 72% of all firms surveyed, including high-technology companies, said they were generally willing to provide the same relocation benefits for new executives as for those transferring within the company. "The willingness to treat a new executive like one of the family marks a sharp break with the past," Houze maintained.

At the same time as liberalizing relocation benefits, more than 50% of the high-technology firms said they would use the services of a third-party relocation firm.

Despite the cost of increased relocation benefits, more than 40% of the high-technology firms said they would continue to seek the best executive talent, the survey noted.

Similarly, only 10% of those firms said they would lower standards in order to avoid such costs.

Conducted among 350 firms last summer, the survey found energy companies to offer the most liberal relocation packages.

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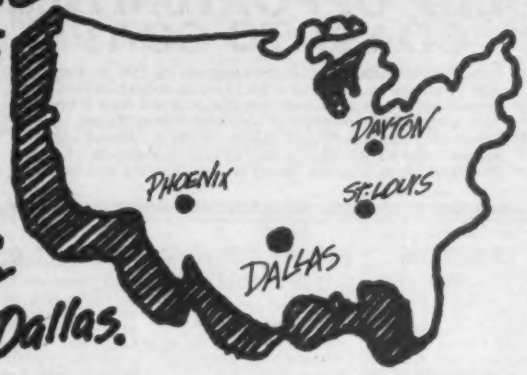

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Immediate openings for experienced Programmer/Analysts who have any combination of training and experience equivalent to a degree in Business Administration, Mathematics, Accounting, Computer Sciences or related fields plus two or more years of experience with DEC, RT-11 and RSX11 M Operating Systems & Fortran. Also, similar experience in COBOL & FORTRAN on large timesharing systems.

Liberal Fringe Benefits
Replies held confidential
Must be a U.S. citizen

Equal Opportunity Employer M/F

Send Resumes to:
Trudie L. Rainey, M/S 567
Reynolds Electrical & Engineering Co., Inc.
Post Office Box 14400
Las Vegas, NV 89114

REECo

EDP OPPORTUNITIES COAST TO COAST

Robert Half, staffed by EDP professionals with 70 offices throughout the U.S., Canada & Great Britain, is the largest network of personnel consultants in the Data Processing field. And its establishment in 1948 also makes Robert Half the oldest. One call and you can search the local, national and international markets. All fees are paid by client companies, of course. The following is a partial listing of opportunities and locations:

DAYTON

TECH SUPP MGR

Ready to expand your horizons? Move with this nationally prominent industry leader. Your IBM systems prog knowledge coupled with a desire to lead sets stage for this mgmt oppty. Don't delay. We'll set up interview immediately. $25-38,000

CONSULTANT

Consulting firm looking for DP pro from a mfg environment with IMS, DB/DC exp. Warehousing applications & mfg bkgrd are +'s. $20-25,000

ROBERT HALF
of Dayton, Inc.
One First National Plaza
Dayton, OH 45402
(513) 224-0800

ATLANTA

PROGRAMMER/ANALYST

Fantastic growth opportunity with division of Fortune 500 Co. Seeks person with State-of-the-Art experience to assist in conversion from System 3/15D to IBM's new 4341 using COBOL. Mfg and Fin applications are a plus. Full relocation package, excellent benefits. $21,000

SYSTEMS PROGRAMMER

Become Systems Mgr quickly with this branch of one of the world's largest retail operations. Qualifications are: BAL, OS/MVS, Sysgen of CICS and Supervisory Experience. Prefers knowledge of NCP, VTAM and IMS. Excellent benefits to include Co discount. Are you #2 and ready for #1 position? $30,000

PROGRAMMER/ANALYST

Established company with a long history of progress looking for dynamic person for addition to staff. Currently using IBM 3031 DOS/VM, COBOL. Excellent growth to management with on-the-move shop. Fantastic relocation policy, benefits & modern offices. $25,000

Ray Jennings
ROBERT HALF
of Atlanta, Inc.
3379 Peachtree Rd. N.E.
Atlanta, GA 30326
(404) 266-2153

LONG ISLAND

SYSTEMS PROGRAMMER

370/CICS Software Development Expanding State-of-the-Arts software dev group needs 3 systems programmers w/3+ yrs 370 CICS internals exp. 3705 networking a +. Higher level position offers possibility for mgmt. Salary $32-38,000

Michele Briggs
Laura S. Sessions
ROBERT HALF
of Long Island
420 Jericho Tpke.
Jericho, NY 11735
(516) 822-8080

MINNEAPOLIS/ ST. PAUL

DIR OF MIS
NO WISC

Fast growth firm needs an individual to bring their computer center in line w/their growth. Excellent challenge includes staffing, long-range planning. Beautiful country and an exceptional position. Must be solid mgr w/good knowledge of mini mkt. Salary to upper $30's.

CONSULTING MGR

Progressive and innovative CPA firm in the TC's is seeking an individual to add to their MAS staff at the mgr level. You must have solid previous exp w/in the CPA MAS function, an understanding of the mini mkt and an MBA or CPA would be helpful. Excellent advancement potential. Light travel. Salary to mid $30's

BAL

Interested in medium-sized, sophisticated IBM Center? Mpls firm needs skilled CICS DL/1 BAL analyst to work on new dvmt. Plenty of room for advancement. Salary mid $20's

PROJECT LEADER

Potential advancement and immediate challenge in Mpls based firm. Lg H W COBOL environment. Several yrs of exp necessary. Personnel payroll bkgrd is ideal. Salary high $20's

Ron Dkystra
or
Kathi Grant
ROBERT HALF
of Minneapolis/St. Paul, Inc.
2236 IDS Center
Minneapolis, MN 55402
(612) 339-9001

All fees are paid by client companies.

PORTLAND

PROG/ANALYST

Corporate headquarters requires 3-5 yrs FORTRAN, COBOL, MARK IV expr. Must have good analytical skills and strong business background. Prefer MBA. Salary $20-30,000

SR SYSTEMS PROG

Fortune 500 co seeks 2+ yrs ASSEMBLER & requires heavy OS/MVS & JES2 expr. Salary $23-29,000

SUPERVISOR, S&P

Major Northwest co requires 3-5 yrs life insurance background. Must have DOS/VS, CICS, and project leader/supvr expr. Will supervise 16. ASSEMBLER knowledge helpful. Salary $26-$32,000

Bob Clawson
ROBERT HALF
of Portland, Inc.
1. S.W. Columbia
Portland, OR 97258
(503) 222-9778

DALLAS

SOFTWARE SPECIALISTS

We are currently filling key positions for several NYSE listed clients. All require IBM, OS or DOS systems background. Specifically, positions require one or more of the following: IMS, CICS, MVS, DOS-VS, DL-1, or assembler. To $32,000

PROGRAMMER/ANALYST

Rapidly expanding shop looking for programmers interested in development work. Must have IBM-OS, COBOL background. Excellent career advancement potential. To $24,000

PROJECT LEADER

Excellent career position. Client needs people with leadership ability. You will be working on leading edge technology. Requires OS/COBOL, analytical skills. To $26,000

NEW DEVELOPMENT

Need Systems Analysts, Project Leaders and Programmers for involvement in a credit reporting system. Requirements include OS, JCL, COBOL and/or assembler programming skills. To $28,000

PROGRAMMER/ANALYST

Shop converting from DOS to OS. Will train in on-line programming if needed. Outstanding relocation policy. Small town environment. Requires one or more yrs COBOL. To $22,000

PROGRAMMER/ANALYST

Energy related company developing Customer Information System needs talented analysts. COBOL and/or PL-1 required. IBM, OS also required. To $26,000

DATA BASE ADMINISTRATION

Large Fortune 500 company needs to add another experienced IMS data base analyst to their staff. Multiple responsibilities position requires five years experience, at least two years IMS. To $26,000

John Staiger
ROBERT HALF
of Dallas, Inc.
Two North Park East
Suite 750
Dallas, TX 75231
(214) 363-3300

PHOENIX

PROGRAMMER ANALYSTS

Major Phoenix based financial organization seeks programmers and analysts at all levels wth banking or financial experience in the areas of: Charge Card, PEP, RIM trust, ATM and EDP audit. Starting salaries range from $17,000 to 29,000.

Roc Rogers
ROBERT HALF
of Phoenix, Inc.
3550 N Central, Ste 1504
Phoenix, AZ 85012
(602) 264-6466

BOSTON

TECH WRITER

Major mini-computer vendor seeks software writer to support data base product line. Will plan, coordinate & implement new doc stds. Ind ldr offering unlimited career oppty. Salary $24,000 range

IMS DESIGNER

Prosperous state-of-the-art retail/mfr seeks top-notch DB/DC analyst for new devel projs. IBM 370 OS/VS1, IMS environ. Oppty to join a small prof corp staff with growth-minded mgmt team. Salary $28,000 range

COBOL SUPPORT

Fast-growing consulting org seeks indiv with min 9 months exp to take on new develop projs under progressive team ldr. IBM 370 OS, COBOL bkgrd pref. Life ins co prog exp ideal. Incentive bonus & tuition reimb. Salary $16,500

CLIENT SUPPORT

Rapidly growing software products co seeks BAL & COBOL P/A for IMS DB support grp. Hvy client-oriented environ requiring effective communicator. Advancement limited only by indiv initiative & desire. Salary to $25,000

HEAT-3 ANALYST/PROG

Respected EDP svcs corp req tech oriented indiv for devel of on-line fin'l apps. NCR 8565/VRX, NEAT-3, COBOL, TRANPRO environ. Will be groomed for tech grp mgmt. Salary $24,000 range

MANUFACTURING ANALYST

Major hi-tech mfg firm seeks aggressive analyst with exp in designing fin'l & mfg sys. Will interface between users & DP and have full life cycle respon. Exp with IMS DB/DC & COPICS pref. Hi-visibility in a growth co. Salary $28,000 range

DOS SYSTEMS PROGRAMMER

Recognized mfg firm req exp'd sys prog to support IBM 370/145 DOS/VSE environ. Will install IBM 4341 & 8100's next year. Must have solid CICS & BAL exp. COPICS & mfg sys a plus. Will relocate from Northeast. Salary $33,000 range

Gerry Battista
ROBERT HALF
of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200

DENVER

MANAGER

Nationally prominent energy corp needs a technical support manager to shape and direct rapidly growing technical demands. Must have a working knowledge of DEC 20 business systems and experience in coordinating telecommunications network. Start $35,000 range

ANALYST

Internationally recognized Colorado service organization is offering an exceptional growth opportunity to an aggressive programmer analyst. Must have experience on an IBM SYS 3 using CCP and the ability to manage a staff. Start $28,000 range with an extraordinary benefit package.

ROBERT HALF
of Denver, Inc.
2 Park Central
Denver, CO 80202
(303) 629-1010

HARTFORD

TECH ADVISOR

Research & plan the hardware, software & dev tech to support major ins dev systems. Strong DB/DC bkgrd req'd. Large scale IBM, CICS/VS & IDMS. Outstanding Conn based fin'l institution. Salary $35,000

PROG ANALYST

Major expansion of premier Central CT corp offers genuine dev oppty & rapid growth. IBM OS or DOS bkgrd. COBOL, JCL, CMS/TSO. Min 2 yrs exp. Full relocation. Bonus program. Salary to $24,000

MGR OF PROG

CT shore based oppty to direct apps prog staff of major mfr. Assume all sys dev in near term. Mgmt bkgrd mandatory. DBMS pref. Any large scale hardware. Salary to $33,000

EUROPE

Netherlands based internat firm seeks prog analyst with COBOL & IMS bkgrd to support European clients. 1-2 yr assignments. US interviews. Reloc expenses client paid. Excellent fringes. Salary to $24,000

SALES SUPPORT

Nat'l Data Comm's clients seeks indiv's for multiple USA openings to provide IBM-oriented hardware/software, network planning functions. Excellent long term growth career paths. Salaries to $33,000

SR EDP AUDITOR

CT mfr has oppty for indiv to assume complete resp for audit function. Indiv must be capable of performing with minimal supervision. Occasional trvl. Salary to $32,000

DIR SYSTEMS

New Eng insurer seeks indiv to direct prop/cas dev staff. Qualified person should have current mgmt & IBM sys bkgrd. Salary to $35,000

Stan Durbas
Paul Meissner
ROBERT HALF
of Hartford, Inc.
111 Pearl Street
Hartford, CT 06103
(203) 278-7170

LOUISVILLE

EDP AUDITOR

Large Insurance Holding Co in Louisville is looking for an auditor with 1 year experience in EDP Auditing and some programming background. Relocation includes Closing Cost and a 10% loan. Salary to $26,000

SR SYSTEMS PROGRAMMER

Louisville Mfg firm is searching for someone with 5 years experience with sysgens. Industry background not important. Currently have installed 370-158 OS/IMS DL-1 will be adding a 4331. Degree not required. Relocation and benefits paid. Salary to $33,000

DP MANAGERS

If you are currently programming and designing on a System 3 15D with CCP, several companies are interested in seeing you. Mfg, trucking, banking or insurance are some of the types of industries that are looking. NO DEGREE required. Relocation paid. Salary to $30,000

Tom Williams
ROBERT HALF
of Louisville, Inc.
680 South Fourth St.
Louisville, KY 40202
(502) 585-1751

BUFFALO

SYSTEMS MANAGER

Div of large mfg co located in Western NY needs combination of admn & data processing bkgrd. Keys to this hi-visibility pos are mfg systems, planning & recruiting. Salary $27,500

SYSTEMS ANALYST

Expansion oppty for solid systems analyst. Will head up design function for textile & paper mfr. Ideal track record includes prog thru implem in a mfg environ. IBM on-line DOS COBOL/PL1 shop. Salary $28,000

SYSTEMS ANALYST

Client co is gearing up for MRP proj. Mfg co presently recruiting for analyst to be member of team resp for customizing & implementing ARISTA software & mfg sys. Data base a plus. Degree a must. Salary $26,000

SENIOR ANALYST

User oriented pos for utility co located in Western NY. Massive sys develop proj req exp in implemen of invty, acctg & specialized sys. Client co will consider wide range of appa bkgrd. Sophisticated IBM 3031 shop. Salary $29,000

PROGRAMMING SUPVR

Central NY ins group is presently expanding. IBM 3031/DOS shop needs sr level prog with up thru the ranks record incl sys dev. Will supv staff of 8 COBOL progs. Must have proven mgmt exp + solid tech ability. Salary $30,000

Pam Siegal
ROBERT HALF
of Buffalo, Inc.
1310 Liberty Bank Bldg.
Buffalo, NY 14202
(716) 842-0801

All fees are paid by client companies.

PROVIDENCE

IMS DB/DC ANALYST

Ind leading Prov based co seeks tech support analyst to design & implem IMS apps. 3032 COBOL OS/MVS environ. Full reloc & interview exp. Salary $28,000

SYSTEMS 38 MANAGER

Small, rapidly growing & very profitable mfr seeks DP "pro" w/SYSTEMS 3/15 D or 34 exp. Hi-visibility oppty in professionally challenging environ. Salary $26,000

SYSTEMS PROGRAMMER

Loc ind pacesetting mfr seeks tech support indiv to evaluate, install & maintain software & operating sys. DOS/VS environ. ASSEMBLER/CICS pref. Tech challenging oppty for internals specialist. Salary $26,000

SYSTEMS ANALYST

Successful RI seacoast mfr has critical need for sr analyst. Join a team involved with major on-line/data base systems implem. Career growth to proj ldr. Salary $26,000

UNIVAC-1100-COBOL

Dramatically expanding hi-tech RI mfr seeks diversified prog & sys design exp w/proj mgmt potential — EXEC — 8, DMS-1100, TIP CMS exp pref. Salary $25,000

Robert Lathrop
ROBERT HALF
of Providence, Inc.
400 Turks Head Bldg.
Providence, RI 02903
(401) 274-5700

ROBERT HALF

MIAMI

EDP AUDITOR

A prestigious South Florida conglomerate is currently searching for an EDP Auditor. As a member of this audit team you will lead or participate in examinations of EDP operations and management, audit automated applications systems and review systems and development. If your data processing career includes at least three years experience as a system analyst, and you have an in-depth knowledge of EDP audit procedures, you should discuss this position with us. Four year degree mandatory. Outstanding benefit program. Salary to $29,000

Chuck Neil
ROBERT HALF
of Miami, Inc.
1395 N.W. 167th Street
Suite 100
Miami, FL 33169
Dade (305) 625-5433
Broward (305) 784-1550

BALT / WASH

PROGRAMMER/ANALYST

Join a technically current, expanding financial institution! You will work on "state-of-the-art" equipment! Position is available because of company's growth! Required: an innovative PROGRAMMER/ANALYST with 3 years experience, COBOL, Assembly, IBM (DOS). CICS exposure helpful — or will be developed on the job! $27,000

ROBERT HALF
of Washington, Inc.
7316 Wisconsin Ave.
Washington, DC 20014

ROBERT HALF
of Baltimore, Inc.
217 The Quadrangle
Baltimore, MD 21210
ask for Carol
(301) 323-7770

ALBUQUERQUE

IBM

Major Albq bank seeks programmers and analysts to fill current openings. Requires exp with IBM 370 OS/VS, CICS. Languages are COBOL and Assembler. Start $18-$24,000 range

SYS/3

Numerous small to medium sized SYS/3 shops have need for programmers and analysts. Requires 3+ years exp with RPG II and/or COBOL. Start $18-25,000 range

Dick Starnes
ROBERT HALF
of New Mexico
P.O. Box 3320
Albuquerque, NM 87190
(505) 884-4557

MILWAUKEE

SYSTEMS ANALYST

Cooly analytical individual who is mildly aggressive. Will help develop hospital applications. COBOL & preferably B-6700 experience will expedite this unique opportunity for advancement. $30,000

SYSTEMS ANALYST

Resourceful and imaginative person who knows inventory management systems will want to take hold of this career step opportunity. DLI is an added plus. $29,000

Tom Thorstad
ROBERT HALF
of Wisconsin, Inc.
777 E. Wisconsin Avenue
Milwaukee, WI 53202
(414) 271-HALF (271-4253)

ST. LOUIS

INTERNATIONAL SYSTEMS CONSULTANT

Travel Internationally! Degree and at least 3 yrs mfg experience using COBOL, RPG II, FORTRAN or BASIC, and IBM 303X or 4300, and Sys 32, 34 or 38 (or equiv) experience. Foreign language aptitude required. To $30,000

TELECOMMUNICATIONS SOFTWARE PROGRAMMERS

2 yrs AL, IBM OS/VSI, SVS or MVS, and 2 yrs prog/anal, using TCAM, BTAM or VTAM qualifies you for this position with top St. Louis based company. IBM 3705, NCP, SNA a plus. To $34,000

APPLICATIONS GROUP LEADER

Responsible for 10+ prog/anal in 370/MVS environment. 5 yrs FORTRAN/COBOL, including 2 yrs proj management experience, and degree in Math or Physical Science required. To $30,000

SR. PROGRAMMER

Degree and 2 yrs COBOL in large hardware environment qualifies you for this position in new dept. Heavy user contact. To $24,000

SYSTEMS ANALYST

Position available at all levels. Degree, 370/IMS, heavy user interface, financial applications req'd. Consulting responsibilities. To $30,000

Charles Shaffer
ROBERT HALF
of St. Louis, Inc.
7733 Forsyth Blvd.
St. Louis, MO 63105
(314) 727-1535

NORTHERN CALIFORNIA

PALO ALTO
SAN JOSE

RPG II MANAGERS OR PROG

System 3/15D or System 32, 34 installations. To $35,000

SOFTWARE MANAGER

IBM 370/OS experience Supv small staff. To $30,000

SYSTEMS PROGRAMMERS

IBM OS & DOS, needed immediately. To $32,000

COBOL PROGRAMMERS/ ANALYST

IBM or Burroughs experience in a manufacturing of financial environment. To $30,000

EDP AUDITORS

IBM OS & DOS environments require EDP Auditors at all levels. To $30,000

DATA BASE ANALYST

Experience with DMS, DL1, ADABAS, IDMS or CICS. To $32,000

Over 1000 positions in Northern California are currently open. If you have experience in:
Banking
Manufacturing
Retail
Insurance

Client companies pay interviewing and relocation expenses. Call us collect today.

Jim Dupre
ROBERT HALF
of Northern California, Inc.
2 Palo Alto Sq. #212
Palo Alto, CA 94304
(415) 493-8700
or
675 N. First St. #609
San Jose, CA 95112
(408) 293-9040

COLUMBUS

SYSTEMS PROGRAMMER

This is an opportunity to utilize your total capacity in a key position. Your indepth knowledge of CICS and 2+ years in an IBM environment will put you in this spring-bound position. If you are currently an applications programmer or systems analyst with CICS background this position has high potential for you also. Salary to $25,000

SR PROGRAMMER ANALYST

Two years as an IBM COBOL programmer and good design experience will qualify you for this positon. A shop where capability outranks seniority. Join this established company with a long history of continued growth in Data Processing. Salary $24,000

PROGRAMMER ANALYST

A position for a self starter who is looking for a special opportunity. Your mature business attitude and 2 years experience with RPG will be well utilized. A newly created position supporting the accounting and manufacturing applications. A N W Ohio Location. Salary $18-22,000

PROGRAMMER/ANALYST

An Online environment where you will fill a vital role. One to two years experience with business applications in Basic. A broad scope position giving exposure to Systems trouble shooting, operations, systems modifications and systems development. A company with a remarkable history of growth and accomplishment. Salary to $22,000

PROGRAMMER

Seize the opportunity to broaden your D P Career. An intensive and challenging position using your IMS background. Work in an online environment mainly programming in PL1 and MARK IV. A company strongly entrenched in its field. An excellent benefit program. Salary to $24,000

SENIOR PROGRAMMER

MULTI-MILLION $ Company with a growth minded management team. Be the senior team member of Information Systems Development group. Five years experience in Assembler with solid Design and Documentation skills as required. A liberal benefit package. Salary $18-23,000

Kurt Hopwood
ROBERT HALF
of Columbus, Inc.
86 E. Broad St., #1150
Columbus, OH 43215
(614) 221-9300

SEATTLE

Downtown firm needs QMF analyst for IBM 3031 OS/VS1 CICS installation. Prefer 5 years total experience, including COBOL prog/analyst, technical writing skills. Do internal consulting to applications development teams. To $24,000

SEATTLE DP shops are eager to interview experienced IBM COBOL & RPG II programmer/analysts. Salary ranges are $16-24,000. If you have 1+ years business/financial experience and plan to visit here, call me collect or send a resume ASAP.

Ray Magill
ROBERT HALF
of Seattle, Inc.
1301-5th Avenue
Suite #2826
Seattle, WA 98101
(206) 624-9000

SOUTHERN CALIFORNIA

LOS ANGELES

PROGRAMMER ANALYSTS

OS BAL or COBOL for large OS/MVS environment. Financial or banking applications. IMS a+. To $29,700

Mini Computer Systems Programmer with Assembler and Data Base Design & Implementation. To $35,000

Duncan White
ROBERT HALF
of Los Angeles, Inc.
3600 Wilshire, Suite 2000
Los Angeles, CA 90010
(213) 386-6805

ORANGE COUNTY

PROGRAMMER ANALYST

Financial applications. You would get involved with major international Orange Cty. based mfr. Heavy development and design background best. No manufacturing. To $30,000

Dave Ankenbrandt
ROBERT HALF
of Orange County, Inc.
2333 N. Broadway #200
Santa Ana, CA 92706
(714) 835-4103

COMMERCE

PROGRAMMER/ANALYST

Strong COBOL. All financial applications. CICS, DL/1 a plus. Client utilizes IBM 4341 with distributed processing. $25-30,000

Bob Dack
ROBERT HALF
of Los Angeles, Inc.
6252 E. Telegraph Road
Commerce, CA 90040
(213) 721-2197

SAN FRANCISCO

SYSTEMS PROGRAMMERS

You can pick and choose the environment and location of your choice as there is a demand far exceeding the supply of qualified professionals. Look below for a sampling of openings.

HP1000, Heavy Pascal, Assembly. Must have developed OS and TP systems in the past. $31,000

3+ years in compiler design to support "SBC 370 Call" development. Assembler, PI/1, TSO, JCL. $OPEN

IBM Assembler, DOS/VS. Prefer CICS or IMS or IDMS. $30,000

1-3 yrs MVS-installation and maintenance, good user contact skills needed also.$38,000

CICS systems software/programmer needed immediately. $30,000

COBOL/BAL, 370 OS, gens and systems programming in background, install 4341 OS CICS VS1. $28,000

This is just a sampling of systems opportunities — if you are looking for othe positions, from applications through senior management, call collect or send your resume now and see what we can do for you.

Jerry Anderson
or
Bob Couch
ROBERT HALF
of Northern California, Inc.
111 Pine Street
Suite 1500
San Francisco, CA 94111
(415) 434-1900

KANSAS CITY

VICE PRESIDENT

Rapidly expanding Mid-western retail group requires 5 years top level management experience. Newly reorganized department requires effective administrator to develop departmental policy and procedures in areas of retail systems with emphasis in project control, reporting systems, and management by objectives. Salary to $70,000

PROGRAMMER

Suburban Johnson County State-of-the Art MVS shop seeks a solid COBOL technician who enjoys programming. Will be responsible for billing and customer service application in both a batch and on-line environment. Command level CICS a plus. Excellent opportunity to get rewarded for good coding skills. Good career path in programming. Salary to $30,000

SOFTWARE

Leading edge opportunity for the experienced DOS/VS professional. Person must be capable of doing DOS/VS GEN as well as CICS and DL/1 support. Exposure to VSE would be a plus. Must be capable of taking complete charge of all DOS/VSE software in new 4331 installation. Salary to $29,000

MANUFACTURING

Expanding suburban manufacturing firm seeks aggressive prog/anal to become involved in on-line manufacturing systems. 2 years COBOL with exposure to BOMP, MRP, or other manufacturing systems qualifies. Merit raises and promotions. Salary to $29,000

DATA BASE

Be a part of the new management team installing a 4341. Must be capable of making decisions and taking charge of complete data base design of new manufacturing systems. Proven track record of taking a project from start to finish is required. Will be involved in complete architecture of new corp data base. Experience with IDMS, IMS, DL/1, and TOTAL or other manufacturing data base qualifies. Salary to $28,000

PROG/ANAL

Fortune 500 firm has excellent opportunity for a prog/anal knowledgeable in RPG II. IBM systems 32 and 34 experience a plus. Firm is rapidly expanding, allowing for unlimited career potential and opportunity to learn COBOL in an OS environment. Progressive benefit package, attractive working environment. Salary to $26,000

George Waterman
ROBERT HALF
of Kansas City, Inc.
127 W. 10th
Kansas City, MO 64105
(816) 474-4583

NEW ORLEANS

PROGRAMMER/ANALYST

Billion $ Energy related firm has need for a person exp in COBOL/DIBOL/FORTRAN is a plus. They are developing a new acc't system. To $25,000

SR PROG/ANALYST

Sub of Fortune 500 firm is seeking an exp P/A with 3 yrs COBOL Bkdg. Fin'l systems. CICS helpful. To $25,000

ROBERT HALF
of New Orleans
135 St. Charles, Suite 1020
New Orleans, LA 70130
(504) 524-3773

NEW YORK

SENIOR ANALYST

Potential packed opportunity with this major oil conglomerate. Co converting from large Sys 3/15 to 4341. 3+ years systems analysis with heavy communications experience and COBOL programming in background. Automate G/L, INVENTORY and payables applications. Very secure. $32,000

DP MANAGER

Excellent upper level position for technically oriented manager. 4+ years FORTRAN programming with responsibility for evaluation of hardware & software in background. HP 3000 experience is a plus. Overall management responsibilitiy for design through implementation with heavy user interface. Newly installed HP 3000 3. $35,000

RPG II SYS 34

Extraordinary opportunity to aid in conversion of SYSTEM 3/10 to SYSTEM 34. 2+ years RPG II programming, financial applications and System 3/15, 32 or 34 experience. Ground floor opportunity in rapidly expanding environment. $25,000

FORTRAN STATISTICS

Opportunity to work in sophisticated time-sharing environment with this "BIG 8" CPA firm. 2+ years FORTRAN programming with TIME-SHARING and STATISTICAL applications experience. Research and development of statistical sampling system. Highly visible with room for growth. $25,000

BASIC +2 DEC PDP II

An unbelievable opportunity for an up-and-coming computer pro. 2+ years BASIC PLUS or COBOL programming and RSTS-E experience. Aid in conversion from IBM to DEC. Outstanding benefits include 30 days vacation. Excellent growth potential. $27,000

Marty Amato
ROBERT HALF
of New York, Inc.
522 Fifth Avenue
New York, NY 10036
(212) 221-6500

SAN ANTONIO

SYSTEMS PROGRAMMER

Degree preferred, IBM 370/OS/CICS/3600, BTAM, NCP, SSS (Network) a MUST. Financial or banking background a plus in this environment. This firm offers growth/earnings unlimited. $35,000

SYSTEMS PROGRAMMER/MANAGER

Degree a MUST, IBM 370/DOS/CICS/COBOL, RPG II a MUST. Any type business background is acceptable with financial a plus. Company offers good benefits. $35,000

PROGRAMMER/ANALYST

Degree preferred, 3 plus years as Assembler programmer with good basic skills. Financial exposure a big plus. Will promote rapidly if well qualified. Good benefits. No job hoppers please. $24,000

PROGRAMMER

Degree preferred, RPG II language with accounting/insurance background a MUST. System 3, 32, 34 exposure a plus. 10 plus holidays and X-mas bonus with fast growth company. $15,000

Bob Baldaut
ROBERT HALF
of San Antonio, Inc.
First Natl Bank Bldg #340
San Antonio, TX 78201
(512) 736-2467

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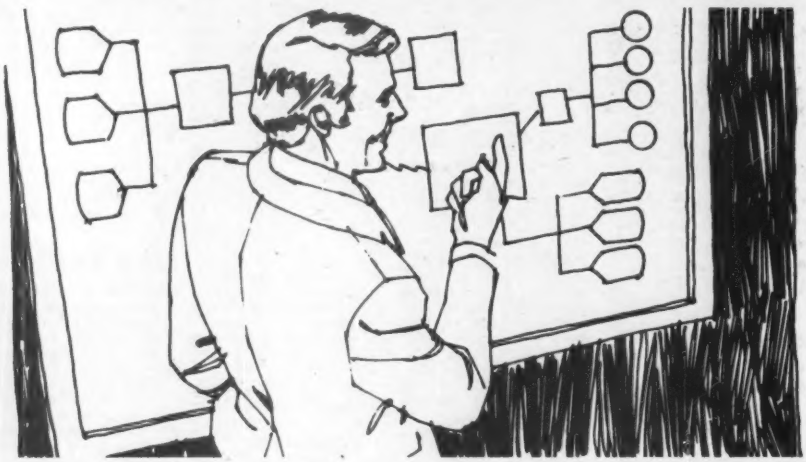
(Call today, tonight or this weekend. Our toll-free lines are open 24 hours a day, 7 days a week. Missouri residents please call 1-800-892-7655, Ext. 117.)



Do you really know if you're in the one best position? Are others getting better exposure? Are you being paid what you're worth? Where will you fit in your present company's plans a year from now? What about in three years? Will you continue to grow or have you peaked out?

In today's dynamic computer field it's almost impossible to stay abreast of what others are doing and whether you are keeping pace. The Source Edp Computer Career Conference has been conceived to help computer professionals analyze and evaluate the current job market and find out where they stand. Key information systems executives from leading organizations in your area and across the nation will be available at the Conference to explain their long-range plans—and where you might fit in. These firms represent a broad cross section of computer user, consulting and service organizations. They are diverse in industry, location, size and types of positions currently available. Each has something special to offer that might better utilize and broaden your skills and potential. Compensation levels are outstanding.

The Computer Career Conference is an easy way for you to investigate a wide variety of career paths rapidly while maintaining complete confidence. Over 15,000 specific positions currently exist with the Conference participants. A brief summary of these openings is presented below.

Applications Programming
The widest choice of alternatives represented in the Conference is provided to those professionals who have one to two years or more of applications programming background. Conference participants will provide direct exposure and training in a variety of languages (COBOL, PL/1, BAL, RPG, BASIC, etc.), operating systems (OS/VS, DOS/VS, VM, etc.), and data base and data communications (IMS, CICS, TOTAL, IDMS, ENVIRON 1, etc.). In almost all cases, assignments will be projects or teams developing new and leading edge computer techniques. Significant opportunities exist for those with solid programming background to move into systems development, software, EDP auditing, or systems evaluation. In addition, professionals with exposure or interest in minicomputers will find a broad variety available at the Conference. All positions offer challenging job assignments providing the opportunity to accelerate career growth. Starting salaries range from $18-$37,000.

Systems Development, Consulting and Project Management
A broad variety of openings exist within Conference organizations for persons with systems development background ranging from Junior Analyst to Senior Project Manager. While any industry exposure is acceptable, a background in manufacturing, finance, and/or distribution information systems will provide the broadest choice. College degrees are preferred, but not required. Ability to interface at all user levels and good oral and written communications skills are mandatory. A number of the Conference organizations offer current applications programmer analysts the opportunity of moving directly into systems design projects. Those more senior are sought for project manager openings. Due to their ambitious MIS expansion plans, several organizations provide formal management training and development programs. State-of-the-art communications and data base oriented information systems are being planned by many of the participants. In addition, exceptional opportunities are available for those desiring to move into line management. Several small to intermediate firms are now making their first thrust into computerized systems implementation. In addition, nationally respected management consulting firms will be represented for those interested in a variety of assignments and high visibility. Starting salaries range from $25-$54,000.

A special invitation to computer professionals with one to five years of experience.

If you are a computer professional with one to five years of experience, the Computer Career Conference offers you a most unique opportunity. Now is the most crucial period in your career. At this point in time, you have an almost unlimited number of career options from which to choose. Unfortunately, this also means you have more opportunities to make an error in selecting your one best career path. A wrong move now could close forever the option that would have yielded you the greatest long term potential. By attending the Conference, you'll gain invaluable career planning knowledge in a matter of days that might otherwise take you years to learn.

Systems Programming and Software Development
The challenges provided by Conference participants in software are both broad and unique. Those with at least one to two years of OS, DOS, DOS/VS, VS, or VM systems programming experience will be able to gain direct exposure to some or all of the following: OS, VS, MVS, JES3, CICS, IMS, TSO, DL/1, BTAM, TCAM, VTAM, OCR, duplex lines, modems, programmable line concentrators, switches, CRT s, IBM up to 370/168 s and 3033 s, and a variety of non-IBM systems including minicomputers. Assignments range from development and modification to maintenance and support of advanced data base and data communications software. Many larger firms offer the combination of formal training and day-to-day association with some of the top technical professionals in the country, providing an ideal environment for professional development and exposure. Some smaller organizations provide an opportunity to join newly formed software support groups. Opportunities also exist for senior software men and women capable of supervising other professionals. A variety of positions are available in the design and/or development of a wide array of new systems software with both established computer manufacturers as well as ground floor opportunities with the new venture hardware companies. Several Conference participants offer software entry level positions for Applications Programmers strong in OS/BAL. Starting salaries range from $24-$52,000.

Marketing and Marketing Support
Those professionals with a background or interest in computer marketing or marketing support will find significant opportunity at the Conference at both the individual contributor and management levels. Unique alternatives exist across a broad front including mainframes, minicomputers, terminal systems, time-sharing, facilities management, proprietary software packages, OEM's, consulting, etc. Those firms selected for the Conference have demonstrated a prior record of success and strong financial stability. Several are just now entering new markets providing exceptional growth potential. Compensation for those in direct marketing at quota ranges from $30,000 to $75,000. In support, salaries range from $22-$38,000.

Mini and Micro Computers
The mini and micro computer market is exploding. There exist substantial demands for professionals having experience in applications programming, software development, systems programming, and management. A background in Assembly language, COBOL, Basic Plus, RPG II or FORTRAN in business applications, systems programming, or software development (real-time operating systems, compilers, communications, or data base) is preferred. Starting salaries range from $23-$45,000.

The Computer Career Conference will be in a city near you soon. There is no charge for your enrollment or participation. Call today for complete details.

Call Mike Parr today, tonight or this weekend at 1-800-821-7700 X117 (Missouri residents please call 1-800-892-7655 X117). Our special Career Conference toll-free lines are open twenty-four hours a day, seven days a week, including Saturdays and Sundays. As soon as we receive your inquiry, one of our professional staff will get back to you about Conference dates for your area, specific opportunities available, and how you may enroll in the Conference. There is no charge to you whatsoever to participate in the Conference—and your confidence will be rigidly protected. Don't miss this unique opportunity. Be sure to call today or this week. If unable to call, write:

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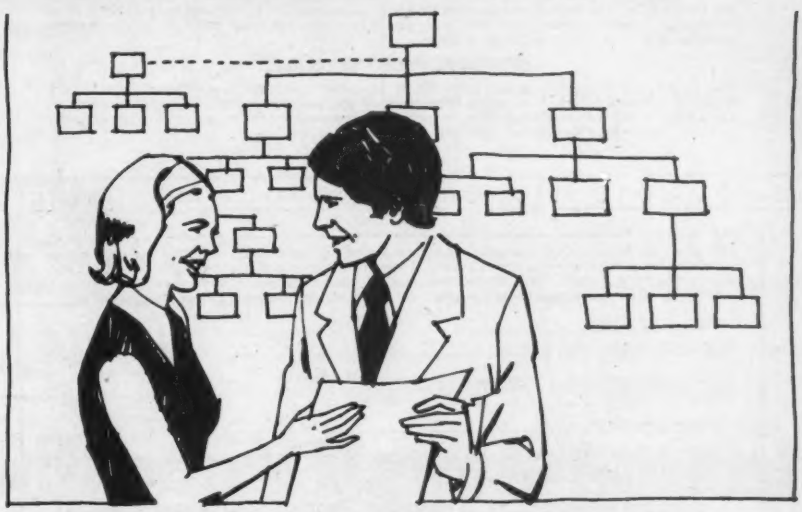
Chicago, Illinois 60606



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SENIOR SOFTWARE RESEARCH ANALYST

This position requires a highly motivated research analyst to plan, develop and implement major software systems and program products, provide technical research, evaluation and advisory service to technical personnel and all levels of management. Prospective candidates must have completed all IBM MVS and JES3 internal schools and acquired a minimum of two years experience in the maintenance and support of both MVS control program and JES3 subsystem. Position involves diagnosing and resolution of software problems through utilization of service aids, IPCS debugging, SMP4, Slip Traps, GTF Traces, RJP Line Analysis, etc. Also development of modifications via coding, testing and implementation of both "inline" code as well as defined user exits. Operating knowledge of MVS under VM is helpful. Networking, VTAM and performance experience a plus. Degree preferred.

SENIOR PERFORMANCE ANALYST

Position involves providing technical guidance and support in the planning, development, and implementation of hardware and software systems as they pertain to defined user service levels from the performance and capacity planning perspective. The successful candidate will be thoroughly familiar with the use of performance/capacity tools such as TESDATA hardware monitors, PLAN IV, MVS, RMF II, CUE, TSA, DSO, PPE and RESOLVE in a large multiple CPU/multi-datacenter environment using MVS 3.8/JES3 and VM/370 6.0 software. The ability to define, conduct, and present performance studies to technical and management personnel and to interface effectively with user representatives is required.

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Position carries responsibility for management and technical direction in the tactical hardware and physical site planning of a large multiple CPU site. Experience in capacity and user service level forecasting are essential. Practical knowledge of building facility management and computer hardware installation are also prerequisite. The successful candidate will interface to computer operations management as well as technical personnel and be recognized by them as expert in the above areas.

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If you consider yourself to be in the top 10% of the TCAM specialists, this position may be just what you are seeking. The incumbent should have 3-5 years experience in TCAM with control block level experience. Strong knowledge of start/stop and bisync protocols are required. 3705/computer experience required. VTAM experience is a plus.

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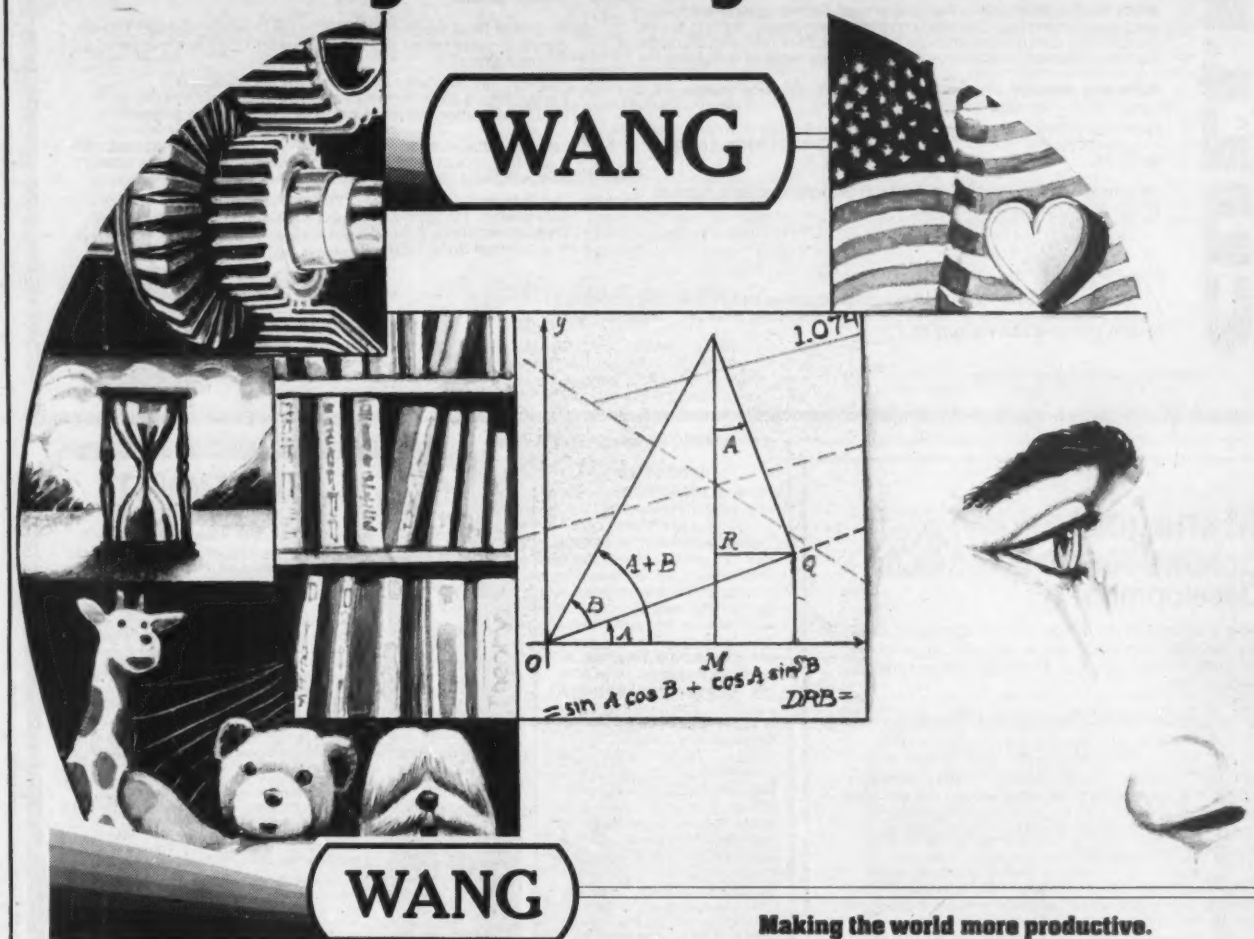

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Systems Software Development.

SYSTEMS SOFTWARE DEVELOPMENT VS DATA BASE DEVELOPMENT

At Wang, we see data base concepts as keys to solving a much broader set of problems than mere data retrieval and presentation. Some problem areas where data base technology are applicable include distributed processing, data base machines, transaction-based systems, networking, display and Forms management, as well as integration of data processing and "office-of-the-future" product directions. Concomitant with these directions, we are committed to helping solve the software engineering problems that currently attend the use of large shared data bases through the development of very high level language interfaces for the application programmer, non-programmer, and data base designer.

At Wang, we are building state-of-the-art dictionaries, hybrid file systems, query and data definition languages, not as an end in themselves, but as tools to help the end user solve his problems. Some of our products like ADMS, and advanced data management system with centralized data descriptions and a sophisticated recovery/restart system, have already been announced and are well on their way toward becoming products. Others like VS-DBMS, a model independent Data Base which supports both relational and navigational interfaces, are currently under design. Still others such as Query Languages, Data Base Design tools, and a Forms Management System are in the planning stages.

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CULLINANE CORPORATION, the most respected company in the computer software industry, is the leader in introducing state-of-the-art software products.

Our continued rapid growth, as reflected by a greater than 44% increase in revenue and profits this past year, provides the challenge and environment required by skilled software professionals.

If you are among the many professionals who are looking for the visability and recognition that a growing company can provide, you may be interested in some of the new positions that our growth has created.

SOFTWARE DEVELOPMENT — Development and enhancement of our database management and audit packages.

Requires minimum 3 years experience in database, data communications, data dictionary or query systems.

QUALITY ASSURANCE TECHNICIANS — Audit installation of all new procedures for software and documentation evaluation.

Requires IBM systems background with strong database and teleprocessing skills. Experience with COBOL or Assembler essential.

TECHNICAL WRITERS — Develop and maintain end-user documentation for our database, data communications and data dictionary systems.

Requires excellent communications skills and at least one year's experience as software technical writer. Familiarity with COBOL, PL/1 or Assembler and IBM systems desirable.

SALES REPRESENTATIVES — Requires proven success in software sales to users of medium/large scale IBM compatible equipment; technical background, data communications and/or database management systems exposure desirable. Positions available in several regional territories.

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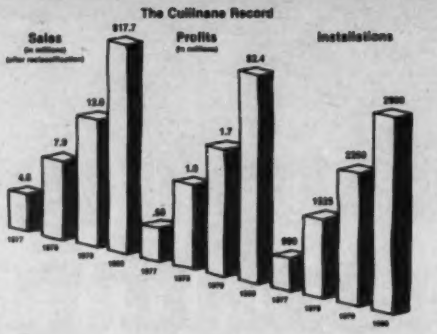
Requires minimum 3 years experience as systems programmer in operating or control systems. Familiarity with DB, DC, or Data Dictionary systems desirable.

TECHNICAL FIELD SUPPORT — Positions in the following Field Support groups are currently available:



Technical Field Support/Audit & Retrieval — Install products, conduct training classes, and provide on-site support to current and prospective customers.

Requires experience with COBOL, Assembler or other high level report generator; familiarity with OS/DOS and JCL required; auditing or accounting background preferred. Positions available in West Coast locations.

Technical Field Support/IDMS — Install products, conduct training classes, provide phone and on-site support to current and prospective customers.

Requires medium/large IBM mainframe and various O/S background. 3 years minimum experience in programming, DC or DB administration. Positions available in several field locations.

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Software Systems Programmers

Entry to senior level positions available requiring a BS or MS in EE, computer science or equivalent as well as 1-6 years' experience in one or more of the following: systems software support/development; assembly language programming on mini/micro computers; significant low-level language and low-level software exposure (device drivers, interrupt handling, bootstraps, etc.); and experience in the design and implementation of software development tools.

Senior Design Engineer

Requires a BSEE, MSEE preferred, and 4-6 years' experience in actual logic and systems design including the design of peripheral interfaces.

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Requires a BSEE, some design and 3 years' reliability experience and field engineering or installation experience. Computer peripheral or related background is desirable.

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Requires a BSEE and 2-5 years' experience in test engineering, fault isolation, stress analysis, and design review.

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You will design, code and debug a major portion of the firmware for the new large-scale, high performance distributed processing system; or you could design the system memory S/W; or you may prefer to evaluate and analyze measurement results. You can take your pick if you have a BS/CS or equivalent with related experience.

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Under direction of Senior Systems Analyst you will design, code, debug, test and document telecommunications systems S/W. A BS/CS or equivalent and knowledge of Assembly languages with Pascal training a plus.

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You will use your expertise in computer performance evaluation to support the development of transaction, interactive and distributed processing systems. Through analysis measurement and modeling you will assist in the production of high performance, highly competitive systems.

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Design and implement microprograms for high level language virtual machines, I/O processor, and memory hierarchy management. Assembly language experience required.

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The Academic Computing Center requires a systems programmer to help maintain a DEC 2060 system running under TOPS-20. Responsibilities include maintenance of the operating system, system utilities, and language compilers. Some experience with graphics hardware and software and telecommunications is also needed. Applicants should have a B.A. in computer science or a related field, 5 years experience with a time sharing computer system, 2 years experience with Fortran, and 3 to 4 years experience with TOPS-10/20 at the system level. Salary is high teens to low twenties. Excellent fringe benefits package, friendly academic atmosphere, and an agreeable living environment in the Burlington area. For further information contact Dr. David Whitmore, Academic Computing Center, University of Vermont, Cook Building, Burlington, Vermont 05405.

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Experience with Microprocessor Hardware and Software and a college degree. Any experience with Z80 Microprocessor is a plus.

SOFTWARE ENGINEER (PIX)

Experience with Z80, Z8001 Microprocessors using Assembly Language and a College degree. Any experience with IBM 3270, Communications, UNIX Operating System or C Language would be a plus.

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Experience with Operating Systems Internals on large scale IBM Systems using Assembly Language. Any experience with I/O Drivers would be a plus.

SOFTWARE DESIGNERS (RESPONSE)

Experience with the design and development of Operating Systems Software, Data Management Systems or Real Time Communication Systems or Compilers using Assembly Language.

SOFTWARE DESIGNER (PIX)

Experience with 16 BIT Mini Computers, I/O Drivers and Real Time Communication using Assembly Language. Any experience on large scale IBM Systems would be a plus.

SYSTEMS ENGINEER/ MARKETING SUPPORT (Dallas, Texas District)

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Experience with large scale IBM Systems under the DOS/VS Operating System using Assembly Language. Any experience with DOS/VSE, VM/CMS, OS/VSI, or OS/MVS would be a plus.

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DATA COMMUNICATIONS

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Phoenix is the site of the centralized development activities using an SNA Communications Management Configuration involving two 3033's, two 168's, three 3031's, four 148's, 15 3705's network processing in a VSI, VTAM/MSNF, CICS/ISC software environment.

Rapid growth and expanding requirements have created the following positions in our Corporate Communications Department:

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Currently, three positions are available for Software Specialists. Successful applicants must have experience in at least one of the following areas: ACF/VTAM, ACF/NCP, CICS Series/1-RPS. Knowledge in more than one area is desirable. The ability to maintain, test and install these products is required. A good working background with SMP would be helpful.

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AMERICAN EXPRESS

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SCG

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Immediate opportunities for professionals with 3-5 years relevant experience, and preferably a technical degree.

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Requires Honeywell GCOS experience or IBM MVS experience. Will provide software support including operations, system generation and maintenance. Will also provide technical assistance in optimizing system productivity.

TELECOMMUNICATION SYSTEM ANALYSTS

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Please send resumes, including salary requirements.

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Attention Robyn Powers

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Software Manager - avionics PDP-11
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Project Manager - insurance 370/OS
Sr. Project Manager - banking 3033
Project Manager - network systems
Project Leaders - mfr 370 or HON or BUR
Project Leader - finance/sales B-4700
Software Engineers - satellite PDP
Software Test Supervisor - HON
Audit Supervisor
Systems Design/Analyst - UNV or BUR
Project Leaders - bank/ins 370 or BUR
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CICS Prog	$28K
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Must have experience in JCL, program testing, documentation writing, and be a skilled user coordinator and trainer. IBM 3031 computer knowledge required. Graduate degree in computer science may offset experience requirement of 2 years. Favorable working condition; 40 hour week, may be required to work overtime and odd hours. $16,000 annual salary.

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Positions are also available at various levels of experience in performing evaluations of computing hardware and software, matching user requirements with available equipment, selecting and acquiring the equipment. Experience with IBM equipment, minicomputers, peripheral hardware, distributed systems and data communications is desirable. Small to large systems are driving a growing population of on-line terminals and applications. Excellent opportunity to work with hardware manufacturing representatives and the computing-user community to evaluate and select other systems.

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For further information, call Duane Bickel collect at (213) 847-4043. Or send resume to Louise Nagato (DB), Lockheed-California Company, P.O. Box 551, Burbank, CA 91520.

Lockheed

Lockheed-California Company
Burbank, California

PSL

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Personnel Department (231-29)
Physical Science Laboratory/NMSU
Box 3—PSL
Las Cruces, New Mexico 88003

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Physical Science Laboratory

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National Liberty Corporation, the most progressive and fastest growing life insurance company in the nation, is seeking an EDP Auditor to join its Internal Audit staff. This individual will work closely with our EDP Audit Manager and have an immediate influence on our audit and control processes. The ideal candidate will have a minimum of 2 years EDP Audit experience, with demonstrated ability to develop audit programs and to evaluate both systems and EDP operations controls and effectiveness. Familiarity with IBM OS, JCL COBOL and CULPRIT, as well as basic accounting principles is desired.

We offer a salary commensurate with experience, comprehensive benefits, and a generous relocation package to beautiful Chester County, Penna, 35 miles west of Philadelphia. Qualified candidates should submit resume with salary history for immediate confidential consideration to:

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Ideal position for an innovative state-of-art professional with the ability to motivate and direct the efforts of a talented systems test and support group. We require a minimum of 7 years of relevant experience in advanced software engineering in both Assembly and high level languages. Hands-on familiarity with hierarchial cycle path testing, cyclomatic capacity and other recent testing and engineering techniques is a decided plus.

SR TELECOMMUNICATIONS ENGINEER

This opening requires a minimum of 5 years experience in the design and implementation of communications software with heavy recent experience in SNA and/or X.25. Hands-on experience with emulation products in an IMS/AFC and ACF/VTAM environment is an asset. Technical creativity and innovation are essential. Reporting to the Manager of Software Design, you will be responsible for articulating and formulating a network products development strategy for large commercial banks.

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Should possess 3-5 years of experience in detailed logic design using standard logic modules, and be interested in working with TTL, MOS-LSI and state-of-the-art microprocessor logic design. You should possess a BSEE (or equivalent), and enjoy working on a wide range of engineering assignments. The ability to communicate and interface with all levels of divisional personnel is essential.

SOFTWARE DEVELOPMENT ENGINEERS

Prior software development exposure at the systems level is preferred for these openings which offer a wide range of state-of-the-art development opportunities in applications, software development, and software support and integration. Ability to assume project leadership responsibilities and communicate effectively with all levels of personnel essential.

SYSTEMS DESIGN ENGINEERS

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DENVER

Jeppesen Sanderson, the leading publisher of flight information charts and training systems is expanding our data processing needs. We need an aggressive growth-oriented professional to contribute to . . . and share in this dramatic growth!

Systems Software Programmer Analyst

Responsibilities of this position include maintaining systems and application on DEC System-20. To qualify, you should have 1 year experience with systems software using an assembler level language (prefer MACRO 10/20) and an additional 3-4 years of data processing programming experience; formal education or training may be substituted for hands-on experience. DBMS preferred. Will provide DEC training.

We offer • Paid Relocation • Security • State-of-the-art technology • On-Line systems • Tuition Assistance • Opportunity for professional growth and advancement.

For immediate consideration, send resume and salary requirements to Shannon Smith or call (303) 779-5757.

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SYSTEMS PROGRAMMERS

To do systems software administration/maintenance of the Input/Output Satellite (IOS). Will assist in the design and implementation of a network driver and associated programs necessary to connect IOS to the local NCS Hyperchannel computer network. MAJOR REQUIREMENTS: MS or equivalent in computer science, engineering, math or physical science, 2-9 years systems programmign experience on medium to large scale system, skill in assembly and/or operating systems languages, FORTRAN or high level programming skills. Also desired are demonstrated skill in modifying operating systems and experience in writing/modifying peripheral equipment drivers. Positions available 1 January 1981.

COMPUTER SERVICE ENGINEER

Will assist in maintaining computer systems, subsystems and devices. Will diagnose, troubleshoot and repair a wide range of machine failures (DEC PDP 11 processors are primary area of maintenance). MAJOR REQUIREMENTS: Logical approach to and moderate skill in troubleshooting computer hardware malfunctions, moderate skill in repairing computer peripherals and basic knowledge of computer architecture, peripheral devices, disk and tape drive structures, CRT technology and DC power supply theory. Also desired is 1-2 years experience in the above areas.

Send resume OR to arrange a contact from NCAR, in California call anytime TOLL FREE 1-800-772-3545, Ext. 370, or outside California, call anytime TOLL FREE 1-800-227-1617, Ext. 370.

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH
1850 Table Mesa Drive
Boulder, Colorado 80307

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NCAR

Programmer Analyst

American Dade, a major division of American Hospital Supply Corporation, is in its early transition stages of major development efforts - from a small shop atmosphere to a modern state-of-the-arts installation. We recently installed a 500 KB Burroughs B3890.

Our new computer provides on-line programming capabilities, qradruples our previous memory, and adds 8 times our past disc capacity...we expect to outgrow it within 3 years.

The opportunities are outstanding for a Programmer/Analyst with 2 or more years experience (COBOL) to take a significant role in this challenging environment.

We provide an excellent salary and outstanding benefits package. For confidential consideration, please send resume to Ray Angele.

American Dade

Division of
American Hospital Supply Corporation
P.O. Box 520672
Miami, Florida 33152

An Equal Opportunity Employer M/F.

SYSTEMS ANALYST CONSULTANT

Hours: 40 per week. **Salary:** $28,000 per year. **Requirements:** Bachelor of Science in Computer Science; 4 years experience in the position; detailed knowledge of large computer opperating systems and their insurance applications; knowledge and experience in the use of COBOL program languages. **Equipment to be operated:** IBM 360-33, hand calculator and 3278 IBM terminal. **Duties:** Analyze various business and accounting procedures used by clients in the life insurance and pension plan industry in order to modify, refine and convert data into programmable form, considering the specific output requirements for management reports required by specific clients; preparation of instructional manuals to be used by client's own personnel for function of complete operations systems.

Index Systems, Inc.
Contact Mr. Berry at
219/484-5421, X3368

COMPUTER SCIENCE-FACULTY

Needed for Spring Semester beginning in mid January. Requires Master's Degree in a Computer Science descipline or Bachelor's plus multiple years of DP experience. Candidate should be capable of teaching all levels of DP, including COBOL and Assembly Language and have either DOS/VSE or OS/JCL experience. 1 year teaching and/or business experience required. Salary commensurate with credentials and experience. **Respond in writing by Nov. 15 to: Mercer County Community College, Personnel Services, Dept SH, P.O. Box B, Trenton, NJ. 08690.**

Equal Opportunity/ Affirmative Action Employer

PROGRAMMER ANALYST

An opening has developed in a growing and challenging environment for an individual with minimum of 3 years experience. The successful candidate must have at least 2 years of advanced education, good communication skills, proven analytical exposure in developing business systems, preferably in a manufacturing facility and some background in a timesharing EDP shop. Experience with PDP11's, RSTS/E and DDP are a plus. Excellent pay benefit package.

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Send resumes including salary requirements to Personnel Manager.

Colt Industries
Trent Tube Division
East Troy, WI 53120
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MODERN SOFTWARE DEVELOPMENT
Lexington, Mass.

CALSPAN CORPORATION has several excellent positions available at facilities in Lexington, Massachusetts.

The work involves: the development of Software using modern techniques for Radar Systems Mission Planning, Data Reduction and Analysis.

We seek: individuals with BS / MS in Computer Science, Physics, Math or Electrical Engineering and experience in either of the disciplines outlined below:

SOFTWARE SPECIALISTS

• structured software development • FORTRAN / IFTRAN / PL-1 • large systems — IBM 370 / CDC 6600 • familiarity with Radar Systems Simulation, and Data Reduction Systems desirable.

RADAR ANALYSTS

• generation of automated test plans for the control of radar operations and data collection • understanding of phased array radar systems, missile systems, radar data on reentry vehicles, radar observables and coherent waveforms is desirable.

The BOSTON TECHNICAL CENTER is a division of the Advanced Technology Center of Calspan Corporation which has, for over 35 years, been a world-recognized leader in Research, Development and Engineering.

We can offer you a professional environment, good work to do, career development, and excellent salary and benefits.

For prompt and confidential consideration of your qualifications for one of these fine opportunities, please send your resume to:

DR. ROBERT B. SOLOSKO — PROGRAM MANAGER

Calspan CORPORATION | BOSTON TECHNICAL CENTER

P.O. Box 9X, Lexington, Mass. 02173

U.S. Citizenship Required
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SENIOR SOFTWARE MANAGEMENT

For decisive roles at NCR's Corporate Headquarters

If you are a seasoned computer scientist/software engineer with demonstrated people skills, you can have a visible and influential role in shaping the future of this major computer company. You will be in Dayton, Ohio, in the department that exercises central control for all software throughout NCR. You will work with senior software, engineering and management people at corporate, marketing and development levels. And you will be expected to innovate on a broad scale—technically, managerially and financially.

The scope of your responsibilities will include: establishing software design . . . preparing software strategies for the next 3-5 years . . . allocating R&D funding . . . preparing short and long term technical system directions . . . approving development plans. In short, we are seeking:

Senior Consultant—Data Base Management Systems Architecture

To act as a data base management systems consultant; advise on architecture; produce technical papers in data base management systems; develop data base management systems technological strategy and direction for NCR.

Senior Consultant—Operating System Architecture

To act as consultant for design of interactive and transaction oriented environments; determine OS requirements; plan overall integration and coordination of OS software.

Senior Consultant—Software Engineering

You will manage development programs to implement component products of the "NCR Software Development Environment" and develop policies and procedures which are supportive of this major software engineering program in NCR.

Senior Consultant—Language Development

You will be directly involved with the development of NCR language strategies and product implementation, with the design and implementation of our language and language development system.

These positions require at least 6-10 years of increasing software development responsibilities, and sufficient experience to establish confidence in your judgment and grasp of where major developments are headed.

In addition to salaries fully commensurate with qualifications and responsibilities, we offer a comprehensive benefits package that includes relocation assistance. Dayton is a well balanced, friendly mid-western area that offers choice of urban-suburban/semi-rural lifestyles and strong cost-of-living advantages.

Please send resume, salary history and requirements in strict confidence or call collect (513) 449-2281 to: Mr. Dale Harmon, Corporate Executive and Professional Recruitment, NCR Corporation, Dept. N50, World Headquarters, Dayton, Ohio 45479.

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PL/1 • IMS • CICS DMS • MARK IV

Princeton University is looking for a creative individual with strong management and analysis skills to direct the work on an IMS database system implemented using CICS data communications.

If you know one or more of the above languages, have supervisory experience and would like to work in this challenging environment (expanding your skills and experience), then this is the right opportunity for you.

Requirements:
IBM 360/370, JCL, PL/1 unless you have CICS experience and IMS or DMS/CICS.

PLUS FACTORS:
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Apply Personnel Services
Clio Hall
Or Call for Application
(609) 452-3273

Princeton University

PRINCETON, NEW JERSEY 08544

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FACULTY POSITION

A Full-time Tenure Track Faculty position in Computer Data Processing is available at Charles County Community College, January 1981. Duties and responsibilities involve teaching Computer Data Processing courses and assist in the Management and Development of Computer Data Processing Curriculum. Qualifications: Masters preferred, Bachelor's required. Closing date Nov. 14, 1980.
If interested, send resume, transcripts and three letters of reference to Charles County Community College, Personnel Dept. P.O. Box 910, La Plata, Md. 20646. EOE/M.F.

APL-COBOL-PL/1

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IMS Systems Programmer

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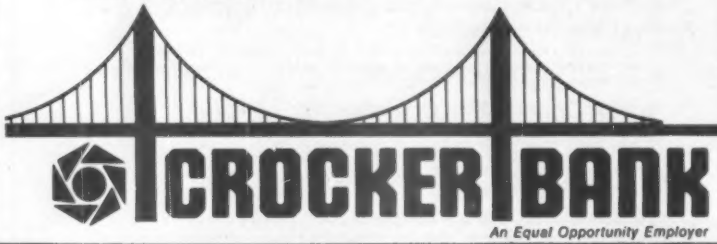
The successful candidate will participate in the development of an IMS Release 1.1.5 environment and the evaluation and installation of IMS related program products. This individual should have experience in IMS System generation & maintenance using SMP4 as well as problem determination and resolution. Prior involvement in training and operations staff, documentation and interfacing with all levels of personnel is also a requisite.

Our environment includes four IBM System 370/3033 processors in a multiple system network facility utilizing MVS 3.8, JES2/NJE, VTAM and IMS Release 1.1.5. This system supports a large branch network of terminals and automated teller machines.

Send resume and salary history in strictest confidence to: **IRINA HENDERSON, Employment Department C113, Crocker National Bank, 155 Fifth Street, San Francisco, California 94103.**



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The need for D.P. professionals in Houston is still great, but my Houston clients demand talent. If you are good at your profession and want an opportunity to prove it, contact me now!

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PROG ANALYSTS	$16-22,000
SR PROG ANALYSTS	$20-26,000
SYSTEM ANALYST	$24-30,000
SR SYSTEM ANALYST	$25-35,000

IBM 370 hardware experience with either assembler language or COBOL skills. IMS and CICS are pluses.

Call Jim Fleming today (collect) at 713-688-1800 to discuss available positions in Houston.

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Houston, TX 77024

Applications Systems Support Manager

Put your creative talents to work for you at Hartz Mountain Corporate Headquarters.

Applicant will provide programming and other technical support to the Managers of Systems Development. Responsibilities will include managing the Programming Staff, directing data base development, conducting quality reviews of proposed systems, creating programming, documentation and control standards, and providing technical assistance to the Department.

The ideal candidate will have a degree, be a Programming Manager, a master COBOL/CICS Programmer, and be a creative, resourceful self-starter.

This position, reporting to the Vice President of Coporate Systems, offers excellent compensation and a comprehensive, company-paid benefit package.

For prompt consideration submit resume to:

Director, Personnel
Reference SSAM
The Hartz Mountain Corporation
700 South Fourth Street
Harrison, N.J. 07029

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CDC CYBER SOFTWARE SUPPORT POSITION

The Educational Computing Network serving the instructional and research computing needs of state universities in Illinois is seeking applicants for a software support position in its Network Software Services group. Minimum qualifications include experience in the installation of package software, experience and ability in the preparation and editing of user and technical documentation, good verbal communication skills and a working knowledge of the CDC NOS Operating System command set and related CDC software products. An indepth working knowledge of FORTRAN and BASIC is essential; knowledge of other high level languages and the CDC Compass assembler is desired.

Salary will be commensurate with qualifications plus excellent fringe benefits. Resumes include salary history should be sent to: **Executive Director, Educational Computing Network, Cottonwood Office Center, Cottonwood Road, Edwardsville, IL 62025.**

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Sr. Distribution Analyst	30K
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Marketing Sys Analyst	26K
Financial Sys Analyst	23K
Programmers	20K

Send resume in confidence to:
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IMS PROJECT LEADER

Rollins, Inc., an Atlanta-based NYSE corporation known for years as a leader in the service industry, is seeking a Project Leader to work with our systems and programming staff on IMS data base design and implementation.

REQUIREMENTS:

- Strong project leadership abilities including implementation
- IBM 370 hardware and OS/VS or MVS software
- Demonstrated success in design and installation of on-line systems
- Minimum 3 years solid experience in IMS DB/DC internals preferred

We offer qualified programmers and analysts an excellent opportunity also.

Your opportunity is NOW.

For immediate consideration, send your resume to:

Jim Morgan
Human Resources

ROLLINS, INC.
2170 Piedmont Road, N.E.
Atlanta, Georgia 30324

ROLLINS FOR A SECURE ENVIRONMENT

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FACULTY POSITION

PURDUE UNIVERSITY SCHOOL OF ENGINEERING AND TECHNOLOGY AT INDIANAPOLIS

An opening in the Computer Technology Department at Indiana University-Purdue University at Indianapolis (IUPUI) is available August, 1981. Applicants must have a strong background in assembler language and IBM operating systems, and a working knowledge of IBM hardware. Business or industrial experience, teaching experience, and a minimum of a master's degree are required. Rank and salary dependent on qualifications. Closing date for receiving applications, including resume and three letters of reference, is November 30, 1980. Contact DR. ROBERT CROZIER, CHAIRMAN, SEARCH AND SCREEN COMMITTEE, IUPUI, 1201 E. 38th STREET, INDIANAPOLIS, INDIANA 46205.

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Martin Marietta Aerospace, NASA's Contractor on the Space Shuttle External Tank, has immediate openings for Univac Application Analysts.

Position requires designing and programming a variety of engineering and specific programs utilizing ANS/COBOL for application on Univac 11XX equipment.

Qualified individuals should possess a BS in Mathematics, Computer Science, or related discipline, and have a minimum of 3 years scientific and/or business programming utilizing data base methodology.

We offer competitive starting salaries and fully paid company benefits. These opportunities exist at the Michoud Assembly Facility located in Suburban East New Orleans. Qualified candidates interested in learning more about these opportunities at Martin Marietta...the tomorrow-minded aerospace people, should forward resumes including salary history to: Ms. Dottie McCann, Martin Marietta Aerospace, P.O. Box 29304, New Orleans, Louisiana 70189. We are an equal opportunity employer, m/f/h.

MARTIN MARIETTA

SYSTEMS MANAGEMENT/ REORGANIZATION

Orange County-

Our client, a highly respected Southern California corporation with worldwide operations, has engaged us to recruit 3 top-notch managers for its DP organization. The department is currently embarking on a dynamic reorganization program. We are searching for a Director of Systems Planning, a Manager of Technical Support, and a Data Base Administrator.

This is an MVS, IMS, Distributed Data Processing environment. The individuals will have previous experience in a large IBM system environment. Respondents should be technically competent and possess a general management perspective. They will have excellent planning, communications, and management skills.

This is an excellent opportunity to join a winning team in a dynamic growth industry. Qualified candidates will be high achievers with potential for continued growth. Excellent compensation packages, benefit program and relocation are offered.

We are consultants to management. For confidential consideration, please send resume and salary history to:

CW Box 2428
375 Cochituate Rd., Rte. 30
Framingham, Mass. 01701

Chief Information Officer

A major New England Academic Health Center is actively seeking a Chief Information Officer.

This exceptional career opportunity offers significant challenge, to the selected candidate, to develop and implement a center-wide Management Information System.

A Baccalaureate Degree in Business Administration or Computer Science is required (Masters Degree preferred) with 5 years progressively responsible experience in a large academic health center in a middle or departmental management position and/or head of systems and programming.

Competitive salary and excellent fringe benefit package.

Please send resume to:

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Each of our firms was selected for membership in NCA only after we were satisfied that they could provide you with the most professionally competent services in your community.

Rather than trying to do it yourself you should enlist the services of professionals who can help you to achieve your goals more quickly and more effectively. And you simply could not make a better choice than an NCA firm.

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3 Fletcher Ave., Lexington, Mass. 02173 (617) 861-1020
Chicago: Thos. Hirtz & Associates,
150 N. Wacker Dr., Suite 1700, Chicago, Ill. 60606 (312) 977-1555
Cleveland: Professional Staffing Systems, Inc.,
4807 Rockside Rd., Suite 300, Cleveland, Ohio 44131
(216) 524-5500
Columbus: Michael Thomas, Inc.,
65 E. Wilson Bridge Rd., Suite 201, Worthington, Ohio 43085
(614) 846-0926
Dallas: DataPro Personnel Consultants,
5580 LBJ Freeway, Suite 650, Dallas, Texas 75240 (214) 661-8600
Denver: EDP Infinity, Inc.,
6000 E. Evans Ave. Bldg. 2-111, Denver, Col. 80222 (303) 753-1788
Detroit: Electronic Systems Personnel,
3000 Town Center, Suite 2580, Southfield, Mich. 48075 (313) 353-5580
Florida: Data Sciences Personnel, Inc.,
P.O. Box 8577, Hollywood, Fla. 33024 (305) 434-6112
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900 Asylum Ave., Hartford, Conn. 06105 (203) 549-4240
Houston: Career Consultants, Inc.,
2000 South Post Oak, Houston, Texas 77079 (713) 626-4100
Indianapolis: Computer Personnel Services, Inc.,
107 N. Pennsylvania, Indianapolis, Ind. 46204 (317) 634-4712
Kansas City: Electronic Data Personnel, Inc.,
1006 Grand, Suite 1202C, Kansas City, Mo. 64106 (816) 421-6031
Los Angeles: Constellation Enterprises,
3250 Wilshire Blvd., Suite 1004, Los Angeles, Cal. 90010 (213) 487-0616
Milwaukee: EDP Consultants, Inc.,
11430 W. Bluemound Rd., Milwaukee, Wis. 53226 (414) 475-0077
Minneapolis: Electronic Systems Personnel,
856 Twin City Federal Tower, 121 S. 8th St., Minneapolis, Minn. 55402
(612) 338-6714
New Jersey: System Search,
2040 Milburn Ave., Maplewood, N.J. 07040 (201) 761-4400
New York: Botal Associates, Inc.,
405 Lexington Avenue, New York, N.Y. 10017 (212) 687-0906
New York, Upstate: CFA Associates Personnel, Inc.,
2530 James St., Syracuse, N.Y. 13206 (315) 463-5225
North Carolina: DataMasters, Div. of TaskForce, Inc.,
P.O. Box 6888, Greensboro, N.C. 27405 (919) 373-1461
Philadelphia: Systems Personnel, Inc.,
207 Fox Lane, Wallingford, Pa. 19086 (215) 565-2920
Pittsburgh: Electronic Systems Personnel,
400 Lawyers Bldg., 428 Forbes, Pittsburgh, Pa. 15219 (414) 391-6450
San Francisco: The Computer Resources Group, Inc. Agency,
303 Sacramento St., San Francisco, Cal. 94111 (415) 398-3535
Seattle: Houser, Martin, Morris & Associates,
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Washington, D.C.: EPS Systems Corporation,
1211 Connecticut Ave. N.W., Suite 210, Washington, D.C. 20036
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John R. Berry, Personnel Manager
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Harrison, AK 72601

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We are an accredited independent graduate school offering MS and PhD degrees, a research center and an information center for the pulp and paper industry.

Send complete resume to Director of Personnel, The Institute of Paper Chemistry, P.O. Box 1058, Appleton, Wisconsin 54912.

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Systems Programmers MVS-JES3-IMS

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Join Texas Instruments in the heart of the Sunbelt. You could work in Dallas, TI's hometown, or just north of Dallas in Lewisville, a growing community of 30,000. Live better in Texas, where cost of living is below the average of major U.S. cities and where there is no state income tax.

TI is building one of the largest worldwide networks of Data Processing Centers. This network is supported from the Dallas headquarters and will include installation and support of major domestic and international computer centers in: Lewisville, Texas; Freising, Germany; Nice, France; Bedford, England; and Tokyo, Japan.

To support this network, we are building a staff of Systems Programmers with MVS, JES3, IMS or TSO background. If you have at least 2 years of systems programming experience and are interested in establishing a long-term relationship with a progressive organization, call: John Heft at 1-800-527-3574 (toll-free) or if calling within Texas call (214) 995-3275. Or send your resume to P.O. Box 2103/Richardson, TX 75080. **U.S. citizenship or permanent U.S. residency required.**

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So take the first step in proving your initiative. Apply yourself by calling Ursula Shepherd toll free at 800-227-1930, to discuss these immediate openings:

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Consulting and providing technical support to field sales and marketing, you must be knowledgeable in the internals of IBM virtual operating systems (MVS, SVS, VS1, VM or DOS/VS). College degree or equivalent experience is required. The ability to write and present technical materials a plus. Openings nationwide.

Field Engineers

If you have the skills and ability to excel in field engineering, you'll be recognized for it at National Advanced Systems. We have openings nationwide requiring an AA in electronics or equivalent military experience. Our more advanced positions require experience on IBM 370/158 or larger CPUs or associated peripherals experience.

Field Support Representatives

Individuals experienced in problem solving with systems control programming are needed to resolve problems in customer systems software, assist field engineering with problem determination, and assist systems support representatives in running benchmarks.

If you can't call, send a letter of inquiry or a resume to Ursula at National Advanced Systems, 800 East Middlefield Road, Mountain View, CA 94043. We are an affirmative action/equal opportunity employer m/f/h.

National Advanced Systems
A Subsidiary of National Semiconductor

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Cody, Wyoming

Husky Oil, a fully integrated oil company, has an immediate opening in its Cody, Wyoming offices for an Application Programmer with 2-5 years OS/VS or related IBM experience.

If you are a COBOL Programmer and your lifestyle could include a small city in the Rocky Mountain West, please send your resume and salary history to:

Dona Copeland
Husky Oil Company
P.O. Box 380
Cody, Wyoming 82414

Husky

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APPLIED DATA RESEARCH, the world's oldest and largest independent systems software products company, currently has available employment opportunities for programming personnel in state-of-the-art product development and support for the Company's Dallas-based DATACOM DB/DC product group.

Candidates for all positions must be skilled in IBM Assembly language and have a minimum of 3 years programming experience. Some data base, data communications, and/or systems programming experience very desirable.

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- Competitive base salary PLUS semi-annual bonuses
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- Excellent benefits including hospitalization, major medical, dental, prescription drug plan, tuition assistance, life insurance, long-term disability, paid sick leave and retirement.

Persons desiring to be considered for career opportunities with ADR should forward a resume, in strictest confidence, including salary history to:

Personnel Director
APPLIED DATA RESEARCH, INC.
8515 Greenville Avenue
Dallas, Texas 75243

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ADR

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Assistant Director of Administrative Computing

Qualifications include: Bachelor's Degree or equivalent experience plus 2 years experience with a medium scale computing system and at least one year of supervisory experience. Duties will include supervision of programming staff of seven, coordination of computing systems and planning. Salary is open and will be based on education, training and experience. Application deadline Dec. 1. A completed application includes a resume, transcripts and recommendations. Mail to:

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For our East Brunswick, N.J. Corporate Data Center

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* **At least 2 years experience on CICS internals. VTAM and NCP with MVS experience a plus.**

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Broward County, Florida, one of the largest major employers in south Florida has immediate challenging opportunities in its information Systems Division utilizing OS/VSI, NCP, VTAM, CICS and IMS/DB methods. Applications are currently being accepted for the following job classes:

Systems Programmer II **$22,128-$29,033**
Requires college degree in computer sciences or related field and four (4) years experience in Systems Analysis, SYSGEN and Maintenance.

Systems Programmer I **$18,816-$24,424**
Requires college degree in computer science or related field and two (2) years experience in Systems Analysis, SYSGEN and Maintenance.

Programmer Analyst II **$21,062-$27,636**
Requires completion of two (2) years of college level course work in computer science and four (4) years computer programming and systems analysis experience.

Programmer Analyst I **$17,719-$23,248**
Requires high school diploma supplemented by college level course work in computer science and two (2) years computer programming and systems analysis experience.

Applications and additional information may be obtained from the

PERSONNEL DIVISION, BROWARD COUNTY
GOVERNOR'S CLUB BUILDING, 2ND FLOOR
236 S.E. FIRST AVE.
FT. LAUDERDALE, FL 33301
Hours: 8:30-5. Phone: 1 (305) 765-5555
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Florida Power & Light Company, Florida's largest electric utility, has immediate openings in our data processing organization in Miami. We are a large multi-CPU shop utilizing IMS DB/DC and CICS in a multi-language environment.

IMS APPLICATION DESIGNERS
SYSTEMS ANALYSTS
PROGRAMMER ANALYSTS

Minimum of two years experience in system analysis and design with five years total data processing experience. Bachelors Degree in Business, Finance, Engineering or Computer Science preferred, or appropriate experience in financial, purchasing, inventory and construction application areas.

SYSTEMS PROGRAMMERS

Experience in OS/MVS, operating system internals in an environment including JES 2, VSAM, CICS and IMS. Data communications software experience with VTAM and Network Control is also desired.

DATA MANAGEMENT ANALYST

Experience with IMS/DC and DL1, IBM's Data Dictionary; project leadership desirable. Successful candidate will assist in Information System planning, establish and manage a data dictionary, and develop a data management function.

We offer competitive salaries, an excellent benefit package, challenging work environment, relocation assistance and year round outdoor living.

Qualified candidates who wish to be considered for these positions should mail their resumé and salary requirements to:

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Florida Power & Light Company
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ANALYST I

Provide computer analysis as required for engineering, manufacturing and financial systems on IBM 4331 using DL/I and CICS. B.S. in Information Sciences with one year experience in FORTRAN and COBOL.

With over 20 years of operating history, this pioneering manufacturing facility offers all of the amenities of a rural setting, yet it is only about 35 miles from the Tri-City area which is home to over a million people.

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Programmer Analyst III

Montana State University

Knowledge of information systems, systems analysis, design, construction, testing and maintenance techniques and practices required. $1,621.67 per month. Rural setting - hunting, fishing, skiing. Send resume to: **Personnel Services, Room 9, Montana Hall, Bozeman, MT 59717 before 5:00 p.m. November 14, 1980.** An affirmative Action-Equal Opportunity Employer.

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Amdahl is the progressive computer company that offers compatibility and performance in large-scale systems. Our growing software R&D efforts focus on a unique team approach that stresses service to users across departmental areas. And our commitment to our employees is reflected in liberal educational assistance programs, outstanding benefits, and generous salaries.

As technical manager of a Software Development Department, you will be responsible for generating software tools to support diagnostics and console systems R&D efforts. The entire group participates in the TOTAL DEVELOPMENT PROCESS, from initial concept through design implementation and support. You will plan, schedule, and track these projects and perform personnel administration, including recruiting. You will also provide technical and administrative interface with other departments. If you have a BSEE, BSCS, or the equivalent, plus a knowledge of software development and maintenance and one or more years of managment or senior technical leadership, this could be the career opportunity you've been waiting for. A sincere interest in user satisfaction is essential.

Please send your resume directly to our **Employment Department/#87-4240, Amdahl Corporation, P.O. Box 470, Sunnyvale, California 94086.** We are an equal opportunity employer through affirmative action.

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NRL

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GS-12 ($26,951-$35,033 per annum)
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The Naval Research Laboratory, Management Information Systems and Special Projects is seeking applicants interested in the development of logical/physical date base(s) to support a large-scale, on-line management information system. Functional areas included are: financial management, personnel, supply, security, maintenance and repair, real property inventory, etc. Responsibilities include conceptual definition and design of the date base(s); establishment of data base related standards, procedures and methodologies; data base backup, recovery, security and monitoring. This position will require considerable involvement with application developers, users, and management officials. Expertise required in data base design and administration. Also desired is experience in applications system development, data communications, and source data automation. Hardware to be used includes a DEC 10, PDP-10, and Honeywell 2220 and CDC 6600.

This is a career Civil Service position with all the normal fringe benefits. Travel and transportation expenses will be paid to those selected. Interested applicants should submit a Standard Form 171, Personal Qualifications Statement, or detailed resume, by 25 November 1980 to:

Naval Research Laboratory
Civilian Personnel Office
ATTN: Code 14-037B-15 CW
4555 Overlook Avenue, S.W.
Washington, D.C. 20375
Telephone: (202) 767-3030

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San Francisco Bay Area

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ADAPAS Specialist We have an immediate need for an experienced Data Base Consultant to participate in the design and integration of large scale systems for this worldwide manufacturer. Several years experience with other DBMS (IMS DB/DC IDMS, IDS) will be considered. Individual will receive extensive training program to make the transition. $30-36K

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Must be experienced, journey-level Systems Programmer to apply. Applicants for Senior Programmer Analyst must have supervision or project-leader experience and have performed the duties of a Software Programmer Analyst.

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SMUD
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Sacramento, CA 95813
(916) 452-3211, ext. 385

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We are seeking an individual to participate in all phases of project coordination from design to implementation, as well as to direct the efforts of a staff of 3-5 Analysts. Selected candidate will have a minimum of 4 years' experience in DP and the ability to utilize current techniques of computer systems, analysis, design and implementation methodologies.

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CHARLOTTE, NC 28202 — J. Schwab, 1742 Southern Nat'l Ctr., 704/375-0600
CLEVELAND, OH 44131 — A. Thomas, 4401 Rockside Road, 216/524-6565
McLEAN, VA 22102 — D. Miller, 1719 Goodridge Drive, 703/790-1335
NEW YORK, NY 10036 — N. Shanahan, 1211 Ave. of the Americas, 212/840-8930
PITTSBURGH, PA 15222 — S. Sayers, 4 Gateway Center, 412/232-0410
PRINCETON, NJ 08540 — G. Romagna, Route 91, CN 6100, 609/452-8135
WILMINGTON, DE 19810 — H. Green, 3516 Silverside Rd., 302/478-5150
HOUSTON, TX 77096 — G. Smith, 3000 Richmond Ave., 713/523-5988
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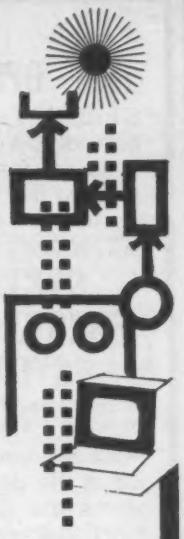

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Senior Systems Analyst for Data Base Systems. 48-week position, salary range $17,884-$29,138. BS (MS preferred) degree in computer science, mathematics, business or other closely related field; working/educational experience with CODASYL type data bases and relational data bases. Five years experience with COBOL and experience with an on-line interactive computing system and "super-mini" operating systems. Application deadline is Nov. 12, 1980 at 4 p.m. Address applications to:

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FLINT, MI 48503
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404-325-3292

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ATLANTA, GA 30345

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The position requires a BS degree in Computer Science or equivalent. Applicants must have working knowledge of database management and communications including previous experience in planning office automation systems for a large company.

You will become part of a team that is directing a rapidly growing, worldwide network of automated applications. We offer an exceptional salary and comprehensive benefits.

Interested parties should send their resume with salary requiremets to **Placement Department E-250, Weyerhaeuser Company, Tacoma, WA 98477.** We are an equal opportunity employer.

Weyerhaeuser Company

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Salary $27,528 to $36,136

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DIRECTOR OF DATA PROCESSING

Joliet Junior College

Position reports to the Vice President of Planning and Informational Resources and is responsible for the college's administrative data processing function as well as for selection and operation of the computer hardware and software systems to support the instructional program. The administrative system is on-line and fully integrated and includes admissions, registration, records, financial aid's accounting, accounts payable and receivable, personnel, payroll and inventory components.

Desired qualifications include a Bachelor's degree or equivalent (Master's degree preferred) in the computer science field plus 3 years of increasingly responsible administrative experience in data processing. Must be familiar with COBOL and have systems design and programming experience.

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Dean of Personnel
Joliet Junior College
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Joliet, Ill. 60436

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This is an outstanding opportunity for a highly motivated individual with a proven track record in design and implementation of quality software. You will participate in the development of a new family of operating systems based on both Z8000 and future architectures. MS Degree or the equivalent required. Familiarity with one or more of the following a definite plus:

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Person needed as of January 1, 1981 to teach Data Processing courses; develop and promote an outstanding Data Processing Program; prepare alternative programs for computer/data processing; make evaluations; implement the results in the curriculum; advise students. Must have Bachelor's degree with a major in computer data processing or equivalent and three years of related experience. Prefer Master's degree, including 18 or more credit hours in computer/data processing with three years of practical experience and three years of practical experience and three years of teaching experience. Academic rank and salary commensurate with preparation and experience. Apply by Novembr 15, 1980:

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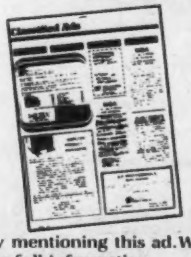

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Reader's Digest

Data Processing

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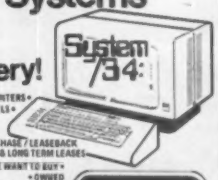

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Alanthus ID/20
Amdax 20-21
American Key Data 53
American Terminal Leasing 66, 67
Applications Software, Inc. 42
Aramco ID/10
Arkay 23

Babb Computer Associates, Inc. 12
BDS Computer 77
John Beall 69

Cerritos Computer Services, Inc. 18
Charter Data Products 45
Comdisco ID/21
Computer Concepts 57
Commercial Data Processing 70
Computer Maintenance & Leasing 14
Computer Sciences Corp. ID/8-ID/9
CW International 79

Data Access Systems 10, 32
Datacorp 7
Data Decisions ID/2-ID/3
Datamedia 39
Datapro 19
Dataprocessing Design 26
Data Systems for Industry 58
Data Systems Services 55
Datum 27
Digital Associates 75
Digital Communications Corp. 64
Digital Equipment Corp./New Products Marketing ID/16-ID/17
Digital Equipment Corp./TPL 16, 82
Norm DiNardi Enterprises 30
Dorlen Products 79
Dynabyte ID/22

Easy Soft, Inc. 32
Eastman Kodak 66-67
EDP Security 33

Fairleigh Dickinson University 81
Fike Metal Products 12
Finar Systems 58
Four Phase Systems 60-61
France Telecom 40

General Electric/Terminet 76
General Terminal Corp. 73
Goal Systems Inc. 62

Hewlett-Packard 65
Honeywell Information Systems 74

I.B.M./General Service Division 37
ILM Corp. 21
Information Concepts 23
Innovative Electronics 44
Insac Software, Inc. 5, 31
Integrated Computer Services 22
Intel Corp. 52-53
International Data Corporation 29
IPL Systems 47
IPS 26

Lear Siegler 24

MacMillan Book Clubs 50
Magnuson Computer Systems ID/12-ID/13
Management International 31
McCormack & Dodge 124
MFE Corporation/Digital Division 13
M.I.S. Associates 33
MRC Industries, Inc. 78
MTI 17
Mike Murach & Associates 9

National Advanced Systems ID/7
National Communications Corp. 63
National Semiconductor 75
Newman Computer Exchange 22
Nixdorf Computer Software Corp. 59
North East Training News 29

Ohio Scientific 18

Pacific Mountain Stakes 44
Periphonics 36
Perkin-Elmer Corp. 34-35, 60
Phoenix Leasing 32

Qwikterm ID/19

Resources Software 22

Signal Technology ID/18
Software International 56, 78
Storage Technology Corp. 51
Sweinhart Electric 78
Systems Manufacturing Corp. 42

Tektronix 33
Telecommunications Technology Corp. 13
Teleray 22
Telex Corp. 43
Terminal Systems 23
Timeplex 41
Tone Software Corp. 32
Transcapital Computer Corp. 44

Unique Information Systems 16
U.S. Design 23

Vector Graphic 71
Verhoef Information Packages, Inc. 20
Vertex 52
Visual Technology 70

Wang 18
Whitlow Computer Systems 3

Xerox 54

Yourdon 25, 80

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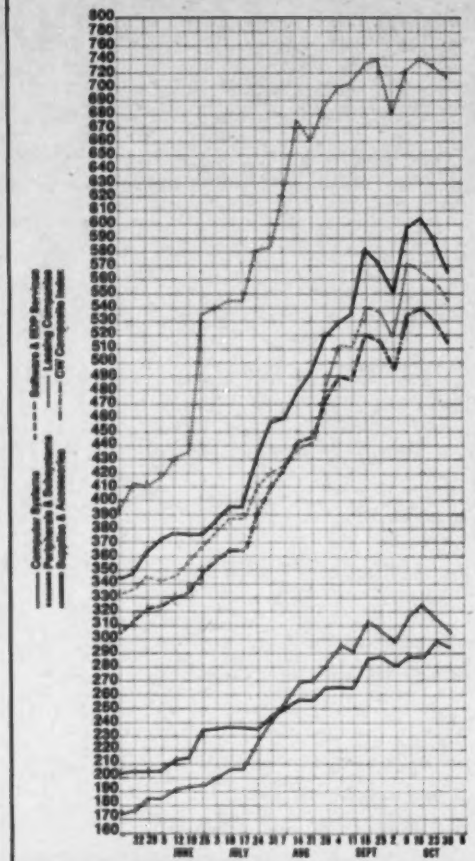
Computerworld Stock Trading Index



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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 29, 1980

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

		1979-80 RANGE (1)	CLOSE OCT 29 1980	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	15- 42	28 3/8	-2 3/8	-7.7
N	BURROUGHS CORP	52- 86	51 7/8	-3 1/8	-5.6
O	COMPUTER AUTOMATION	9- 27	23	+ 3/4	+3.3
N	CONTROL DATA CORP	39- 77	67 3/4	+4	+5.5
O	CRAY RESEARCH INC	30- 99	85 3/4	+5	+5.5
N	DATA GENERAL CORP	46- 87	73 1/2	+1 1/4	+1.7
N	DATAPOINT CORP	44- 97	85 1/8	+5 7/8	+6.4
N	DIGITAL EQUIPMENT	52- 96	85 3/4	+4 1/4	+5.7
A	ECD INC	9- 23	21	+ 1/8	+0.5
N	ELECTRONIC ASSOC.	8- 12	9 3/4	- 5/8	-6.0
N	FOUR-PHASE SYSTEMS	20- 49	47 3/8	+1 1/4	+4.3
N	FOXBORO	31- 57	54 5/8	-2 1/8	-3.7
O	GENERAL AUTOMATION	7- 19	9 1/2	- 5/8	-6.1
O	GRI COMPUTER CORP	1- 3	1 1/8	0	0.0
N	HEWLETT-PACKARD CO	48- 82	75 3/8	-2 7/8	-3.6
N	HONEYWELL INC	65-101	88 3/4	-2 7/8	-3.1
N	IBM	58- 79	65 3/8	-2 1/4	-3.3
O	MAGNUSON COMP SYSTS	20- 37	37 1/4	+1 3/4	+4.9
N	MANAGEMENT ASSIST	9- 25	22 7/8	-1	+4.1
O	MANUFACTURING DATA S	22- 69	68	+3 1/2	+5.1
O	MINI-COMPUTER SYST	2- 6	3	- 1/8	+4.0
O	MODULAR COMPUTER SYS	9- 31	26 1/8	-1 1/8	-4.1
N	NCR	52- 82	67 1/2	-2 3/4	-3.9
N	PRIME COMPUTER INC	15- 49	42 1/2	-1 3/4	-3.9
N	PERKIN-ELMER	28- 68	62 1/2	+3 3/8	+5.1
N	SPERRY RAND	42- 60	50	-1	-1.9
A	SYSTEMS ENG. LABS	11- 45	40 3/8	- 5/8	+1.5
U	TANDEM COMPUTERS INC	13- 68	5[illegible]	+4 3/4	+7.4
N	TEXAS INSTRUMENTS	79-144	121 1/4	+7 7/8	+5.8
A	WANG LABS.	17- 80	97 3/8	- 1/8	+0.2

LEASING COMPANIES

O	BUDTHE FINANCIAL CP	13- 27	23 1/4	-1 1/2	-6.0
N	CUMMINSCL INC	6- 18	16	-1 3/8	-7.9
A	COMMERCE GROUP CORP	1- 2	2	0	0.0
A	COMPUTER INVSTRS GRP	2- 4	1 7/8	+ 1/8	+7.1
O	CONTINENTAL INFO SYS	2- 15	5	- 1/2	+9.0
N	DARTMOUTH RENTAL	2- 5	4 1/8	0	0.0
A	DCL INC	3- 6	3 1/4	+ 1/8	+4.0
N	UPT INC	5- 12	7	- 1/2	+6.6
N	ITEL	1- 15	1 1/2	+ 1/8	+9.0
O	LEASPAC CORP	1- 2	1	0	0.0
A	PIONEER TEX CORP	2- 4	3 3/8	- 1/4	-6.8
N	RELIANCE GROUP INC	24- 79	68 5/8	-1	-1.4
N	U.S. LEASING	12- 24	22 1/2	- 7/8	-3.7

SOFTWARE & EDP SERVICES

O	ADVANCED COMP TECH	1- 8	4 1/2	0	0.0
O	ANACOMP INC	7- 21	20 1/2	- 1/4	-1.2
O	ANALYSTS INTL CORP	3- 10	9 1/4	- 1/2	-5.1
A	APPLIED DATA RES.	6- 24	21	- 7/8	+4.0
N	AUTOMATIC DATA PROC	31- 52	47 3/8	-1 5/8	-3.3
O	COMPUTER HORIZONS	1- 9	5 3/4	- 1/4	-4.1
O	COMPUTER NETWORK	4- 9	7 1/8	+ 5/8	+9.6
N	COMPUTER SCIENCES	11- 30	28 3/4	- 3/8	-1.8
O	COMPUTER TASK GROUP	1- 22	19 1/2	+2	+9.5
O	COMPUTER USAGE	2- 10	6 3/4	+1 1/2	+18.1
O	COMPUT AUTO REP SYC	4- 10	8 7/8	- 1/4	-2.7
O	COMSHARE	11- 21	17 1/2	+1 1/4	+6.6
O	CULLINANE CORP	18- 65	55 1/2	+3 1/2	+6.9
O	DATA DIMENSIONS INC	1- 4	1 3/4	0	0.0
O	DATATAB	1- 4	1 1/4	0	0.0
O	DSI CORP	4- 9	7 1/2	- 1/2	-6.2
N	ELECTRONIC DATA SYST	19- 37	31 5/8	- 3/8	-1.1
U	INFORMATICS INC	9- 25	19 7/8	- 7/8	-4.2
O	INSYTE CORP	1- 3	1 7/8	- 1/4	-11.7
O	IPS COMPUTER MARKET.	2- 4	2 1/2	0	0.0
U	KEANE ASSOCIATES	3- 9	6 1/4	0	0.0
O	KEYDATA CORP	2- 5	1 7/8	+ 1/4	+15.3
A	LOGICON	12- 28	25 7/8	-1 5/8	-5.9
U	MATHEMATICA INC	5- 18	14 1/4	0	0.0
U	MATHEMATICAL APP GRP	7- 33	27 1/2	- 1/2	-1.7
U	NATIONAL DATA CORP	10- 29	25 5/8	-1 3/8	-5.0
N	PLANNING RESEARCH	5- 13	11 5/8	+1	+7.9
U	PROGRAMMING & SYS	1- 1	3/4	0	0.0
U	RAPIDATA INC	4- 9	7 7/8	+ 5/8	+8.6
O	REYNOLDS & REYNOLD	21- 34	21 1/2	-1 1/2	-6.5
O	STSC INC	6- 19	18 1/4	+ 3/4	+4.2
U	SCIENTIFIC COMPUTERS	6- 27	25	+1 1/2	+5.6
N	TYMSHARE INC	34- 79	73	+5 3/4	+7.3
A	UMS SYSTEMS	9- 15	14 5/8	+ 5/8	+4.0
N	WYLY CORP	4- 20	18 1/8	+ 3/4	+4.3

PERIPHERALS & SUBSYSTEMS

N	AM INTERNATIONAL	13- 24	15 7/8	+ 7/8	+5.8
N	AMPEX CORP	14- 34	29 1/2	-2 7/8	-8.8
N	ANDERSON JACOBSON	9- 18	16	+ 5/8	+4.0
N	APPLIED DIG DATA SYS	9- 12	12	+ 1/8	+1.0
O	AUTO-TROL TECHNOLOGY	18- 62	39	-10	-20.4
O	BEEHIVE INTL	9- 16	16 3/4	- 1/2	-2.8
A	BURR-BROWN R & DEV	12- 35	30 3/8	+3 1/4	+9.6
N	BUNKER-RAMO	17- 41	36 1/2	+1	+2.8
O	CAMBRIDGE MEMORIES	1- 9	3 3/4	- 1/8	-3.2
N	CENTRONICS DATA CORP	20- 55	29 7/8	-1 1/4	-4.0
A	CETEC CORP	3- 7	6 3/4	- 1/4	-3.5
O	COMPUTER DEVICES INC	9- 10	7 7/8	0	0.0
O	CUGNIFUNICS	1- 8	7 5/8	+ 1/8	+1.6
O	COMPUTER COMMUN.	4- 10	8 5/8	+ 5/8	+8.6
O	COMPUTER CONSOLES	4- 29	20 3/4	+ 7/8	+4.0
O	COMPUTER TRANSCEIVER	1- 5	3 7/8	+ 1/8	+3.3
N	COMPUTERVISION CORP	24- 92	63 3/4	-1 1/8	-1.7
N	CUNNOL CORP	13- 25	16 7/8	- 5/8	-3.5
O	DATA ACCESS SYSTEMS	6- 17	13 3/8	- 1/8	-0.8
A	DATA PRODUCTS CORP	11- 35	28 1/2	+2 3/8	+7.6
U	DATUP INC	2- 9	4 5/8	+ 5/8	+15.6
U	DECISION DATA COMPUT	2- 6	4 1/2	- 1/2	-10.0
U	DELTA DATA SYSTEMS	1- 3	2 1/8	+ 1/8	+6.2
N	DOCUPATION INC	7- 27	16 1/4	+ 3/8	+2.2
O	DATARAM CORP	6- 37	9 7/8	+ 1/4	+2.4
N	ELECTRONIC M & M	3- 8	7 1/4	+ 1/4	+3.3
U	EVANS & SUTHERLAND	21- 72	70	+ 1/2	+0.7
U	FAMRI-TEK	1- 4	3	+ 1/8	+4.0
O	GENERAL COMPUTER SYS	1- 6	4 3/4	+ 1/8	+2.5
U	GENERAL DATACOMM IND	12- 30	26 1/4	+1	+3.6
O	GENERAL TERMINAL CP	1- 4	1 7/8	+ 1/4	+15.3
N	MADELINE CORP	12- 33	27 1/4	+2 1/4	+7.6
N	MARKEL CORP	25- 52	51 3/2	+ 3/4	+1.4
O	INFORMATION INTL INC	8- 15	12 3/4	- 1/2	-3.7
O	INTEL CORP	23- 50	45 3/4	-2 1/4	+4.6
O	INTERSIL	13- 33	33 1/8	+ 1/8	+0.3
A	LUNDY ELECTRONICS	4- 17	14 5/8	+1 1/8	+7.1
O	PSI DATA CORP	9- 16	13	+1 3/4	+11.8
N	MEMOREX	10- 34	15 1/2	- 1/2	-3.1
N	MUMANK DATA SCI	10- 31	27 1/8	+2 3/8	+8.0
O	OMEX	2- 12	12 1/2	0	0.0
A	PARADYNE CORP	18- 92	91 1/4	- 5/8	-1.2
U	PENRIL CORP	9- 15	12 7/8	+ 5/8	+4.6
O	RAMTEK CORP	10- 18	17	+ 1/4	+1.4
U	RECOGNITION EQUIP	9- 21	18	+1 3/8	+7.0
U	SCAN DATA	1- 5	2 1/8	- 1/8	-7.8
N	STORAGE TECHNOLOGY	12- 24	22 5/8	- 1/8	-0.5
U	SYKES DATATRONICS	14- 47	46	+1	+2.2
U	T BAR INC	14- 22	20 1/4	+ 1/2	+2.4
A	TEC INC	3- 9	5 1/8	+ 5/8	+10.8
N	TEKTRONIX INC	42- 70	62 1/2	- 3/4	+0.5
N	TELEX	3- 6	4	- 1/8	+2.0
U	TESDATA SYSTEMS CP	8- 26	13 1/2	-1 3/4	-11.4
A	TIMEPLEX INC	7- 29	21 1/2	-2 1/8	-8.9
O	WILTEK INC	1- 3	1 7/8	- 5/8	+25.0

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A	AMERICAN BUS PRODS	8- 15	13 1/4	- 1/2	-3.6
U	BALTIMORE BUS FORMS	1- 2	1	0	0.0
N	BARRY WRIGHT	8- 22	18 1/8	- 5/8	-3.3
U	CYBERNATICS INC	1- 2	1 5/8	+ 1/8	+8.3
A	DUPLEX PRODUCTS INC	11- 16	13 1/2	- 3/4	-5.2
N	ENNIS BUS. FORMS	13- 21	16 3/4	+1	+6.6
N	3M COMPANY	46- 63	56 1/2	- 1/8	-0.2
U	MOORE CORP LTD	27- 37	33	+1	+2.9
N	MOSPLA CORP	20- 35	27 7/8	+1	+3.4
U	STANDARD REGISTER	22- 35	31 3/4	+1 1/4	+3.7
A	TAB PRODUCTS CO	9- 24	23 7/8	- 1/2	+2.0
N	WABASH MAGNETICS	11- 20	18 5/8	+1 1/8	+5.6
N	WALLACE BUS FORMS	23- 50	48 1/2	+2	+4.3

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